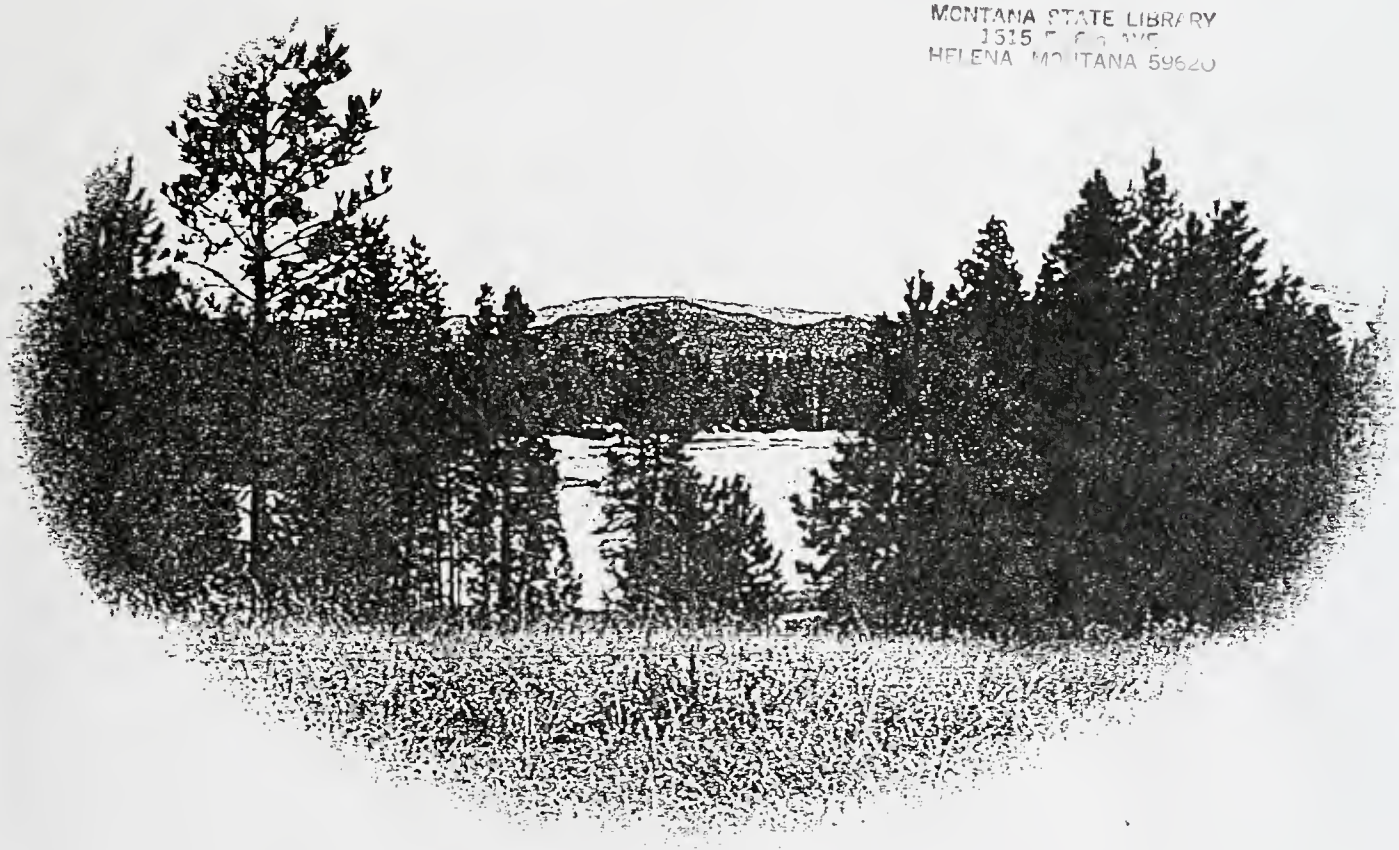
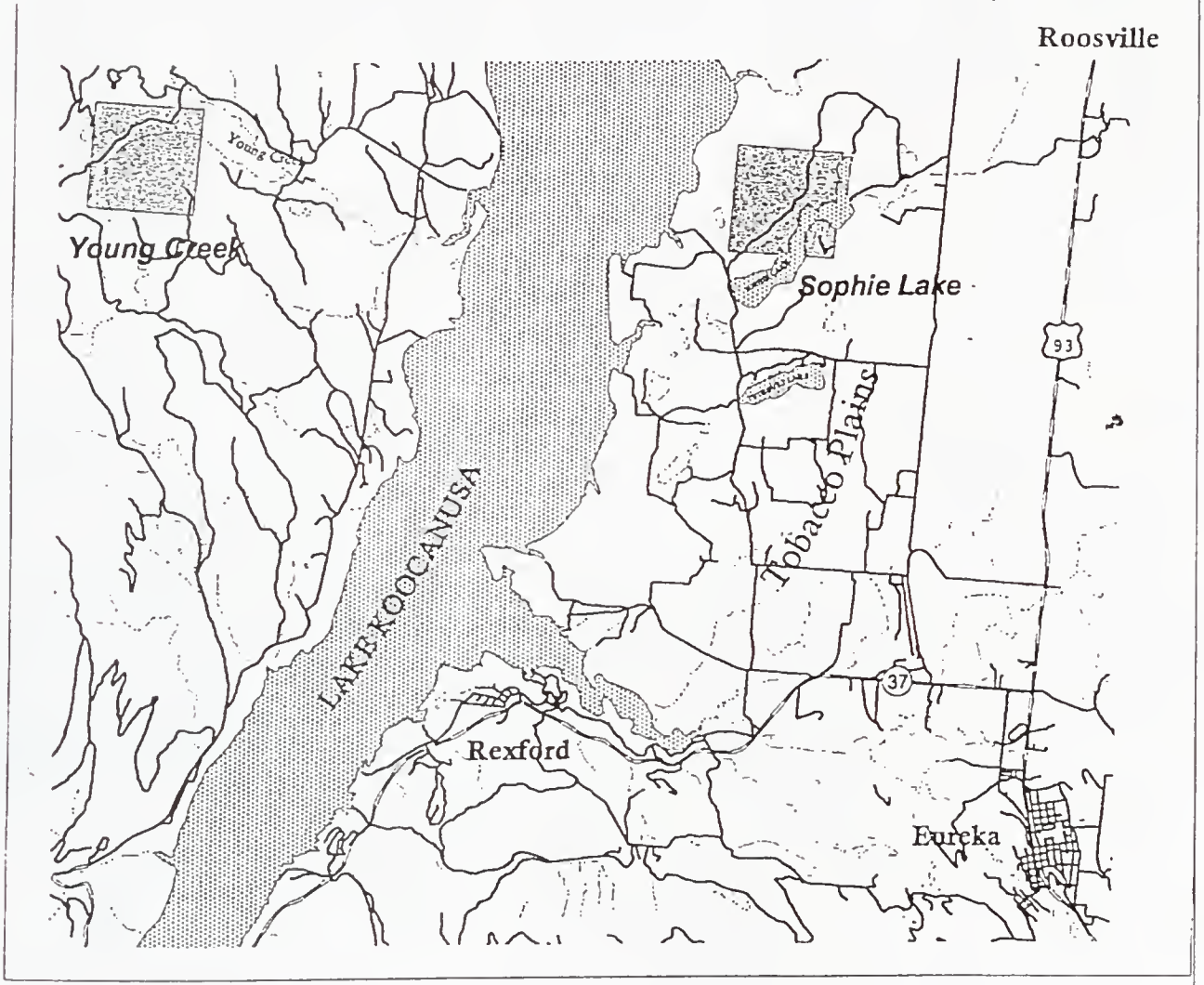
YOUNG/SOPHIE TIMBER SALE AND STREAM RESTORATION PROJECT

ENVIRONMENTAL ASSESSMENT
February 2003



Montana Department of Natural Resources and Conservation
Stillwater State Forest

YOUNG/SOPHIE TIMBER SALE AND STREAM RESTORATION PROJECT VICINITY MAP



0 3 6 Miles

N
W E
S

Young Creek & Sophie Lake Project Areas

PROPOSED YOUNG SOPHIE TIMBER SALE AND STREAM RESTORATION PROJECT

FINDING FOR THE TIMBER SALE AND THE LAND-USE-LICENSE PORTION NEEDED FOR THE STREAM RESTORATION WORK

STILLWATER STATE FOREST

An interdisciplinary team (ID Team) has completed the Environmental Assessment (EA) for the proposed Young Sophie Timber Sale and Stream Restoration Project.

After a thorough review of the EA, project file, public correspondence, Department policies and standards, and the State Forest Land Management Plan (SFLMP), I have made the following 3 decisions:

1. **ALTERNATIVE SELECTED - Action Alternative B and Young Creek Restoration Land Use License**

   Two alternatives are presented and were fully analyzed in the EA:

   - No-Action Alternative A, includes existing activities, but does not include a timber sale.
   - Action Alternative B proposes harvesting approximately 1.6 million board feet (MMBF) of timber from an estimated 756 acres; builds roughly .6 mile of new road and abandons approximately 2.5 miles of nonessential road; and, plants ponderosa pine on approximately 50 acres in the areas that will be harvested within the State Young Creek section. Action Alternative B includes issuing Montana's Department of Fish, Wildlife, and Parks (DFWP) a Land Use License (LUL) for the proposed Young Creek Restoration Project. The timber sale will generate an estimated $212,820 of total revenue, with $129,236 projected as trust fund revenue.

   I have selected Action Alternative B, with the mitigations and specifications identified in the EA implemented as prescribed.

   Action Alternative B has been selected for the following reasons:

   - This alternative meets the Purpose of Action and the specific project objectives listed on pages I-1 and I-2 of the EA.
   - The analyses of identified issues did not reveal information to persuade the Department to choose the No-Action Alternative prior to this decision.
   - Action Alternative B includes adjustments, modifications, mitigations, and activities to address concerns expressed by the public, including, but not limited to:
     - Concentrating the harvest in areas dominated by tree species most susceptible to insect and disease problems. This treatment will improve the long-term productivity of timber stands by increasing stand vigor and reducing incidence of insect infestations and disease infections.
     - Alleviating problems, such as lateral bank scouring, increased

sediment supply, and the potential for increased flooding, on a 1,200-foot section of Young Creek that has been confined, straightened, and levied for over 50 years.

- Reducing the potential for catastrophic fires adjacent to private lands by reducing fuel loading in the forest.
- Avoiding stands classified as old growth.
- Completing site improvements on existing roads to improve drainage, water quality, and safety.
- Implementing Best Management Practices (BMPs).
- Protecting streamside management zones (SMZs).

- DNRC is required to administer these lands to produce the largest measure of reasonable and legitimate long-term return for beneficiaries *(Montana Codes Annotated [MCA] 77-1-202)*. DNRC meets this obligation by managing intensively for healthy and biologically diverse forests.
- The proposed timber sale project contributes to harvest levels mandated by State Statute *(MCA 77-5-222)*.

2. **SIGNIFICANCE OF IMPACTS - No adverse impacts are determined to be significant.**

I find that none of the negative impacts associated with the project are regarded as severe, enduring, geographically widespread, or frequent. Further, I find that the quantity and quality of various resources, including any that may be considered unique or fragile, will not be adversely affected to a significant degree. I find no precedent for future actions that would cause significant impacts, and I find no conflict with local, State, or Federal laws, requirements, or formal plans. In summary, I find that the identified adverse impacts will be avoided, controlled, or mitigated by the design of the project to an extent that they are not significant.

- Wildlife - Approximately 756 acres of forest canopy will be opened to varying degrees. Harvesting activities on Sophie Lake are sufficiently distant from a suspected eagle nest on the southeast shore to avoid adversely impacting bald eagles. The 13-acre stand along Young Creek that is suitable Canada lynx habitat will not be impacted by this project. There have been no grizzly bear observations or documented wolf-pack use in either area. However, existing or planned access restrictions would maintain or reduce disturbance levels in either case. Treatments are expected to improve habitat conditions for Columbian sharp-tailed grouse on the Sophie Lake section. The combination of harvest treatments is expected to benefit flammulated owls. Harvesting avoids habitats typically preferred by fisher. Harlequin duck habitat will not be disturbed. Large trees and existing snags will be retained, minimizing impacts to pileated woodpeckers. Some thermal and hiding cover will be reduced for big game, but the magnitude of these changes is expected to have negligible impacts to big game survival. A barbed-wire fence installed around the Young Creek Restoration Project is expected to prohibit cattle use while allowing wildlife passage.
- Vegetation - None of the timber-stands harvested by Action Alternative B

are classified as old growth. Most of the stands entered have been entered previously. The proposed harvest will reduce stocking levels while leaving many of the largest and healthiest ponderosa pine, western larch, and Douglas-fir. This harvest will not result in a change in covertype, but will change 56 acres from the 150-plus age class to the 0-to-39-year age class. Where available, approximately 2 to 5 snags per acre will be retained. The harvest units may provide an opportunity for fuel breaks in the event of a wildfire, especially adjacent to private lands. Treatments retain trees that are more resistant to insect and disease attacks; retains species that are less susceptible to root and stem rots; and, regenerates a tree-species composition that is more diverse. No known populations of sensitive plants have been documented on State trust land near where harvesting activities are proposed.

- Noxious Weeds - Heavy equipment used for sale activities will be washed thoroughly before being brought on site; disturbed areas will be seeded with a grass seed mix concurrently with disturbance. Site-specific herbicide spraying will occur on Forest Service haul roads. Monitoring will take place to provide for early detection and treatment of noxious weed infestations.

- Hydrology - Proposed activities will increase equivalent clearcut acres (ECA) by 42 acres at Sophie Lake. Young Creek activities will increase ECA by 112 acres, resulting in a water-yield increase of less than 1 percent. Cumulatively, the total annual water-yield increase of 11 percent is well below the allowable threshold level of 12 percent and not enough to create an unstable channel. Planned road abandonment and restoration will reduce the potential for sediment introduction into project-area streams.

- Fisheries - Young Creek is one of the most important westslope cutthroat trout spawning tributaries to Koocanusa Reservoir. Impacts to fisheries resulting from DFWP's decision to implement the Young Creek Restoration Project are detailed in a separate finding prepared by DFWP. Issuing DFWP a LUL to complete their project is expected to substantially improve fish populations and fisheries habitat within Young Creek. Harvesting activities are not located within the riparian zone of Young Creek, and the increase of less than 1 percent in annual water yield will not cause stream-channel instability.

- Soils - Action Alternative B would impact less than 15 percent of harvested areas, with these impacts minimized by use of existing skid trails and soil-moisture restrictions on timing of operations. Prescribed mitigation measures will also provide sufficient downed woody debris for nutrient needs and erosion control. Impacts to soil resources are within DNRC standards in the SFLMP.

- Economics – The proposed project should generate approximately $129,236 in net income for the associated trust beneficiaries, and $212,820 in total State net income. The level of harvest represents support for 17 jobs for 1 year, with the total estimated income of $543,220. Department of Natural Resources and Conservation (DNRC) will waive DFWP the LUL rental fees in lieu of performance, maintenance, and monitoring, as authorized under a Memorandum of Understanding between the 2 departments in 2002.

- Precedent Setting and Cumulative Impacts - The project area is located on State-

owned trust lands that are "principally valuable for the timber that is on them or for growing timber or for watershed protection" *(77-1-402)*. Since the EA does not identify future State actions that are new or unusual, the proposed timber sale project is not setting precedence for a future action with significant impacts.

Taken individually and cumulatively, the impacts of the proposed timber sale are not significant. The proposed activities are common practices and none are being conducted on important fragile or unique sites.

The proposed timber sale project and issuance of a LUL conforms to the management philosophies of DNRC and is in compliance with existing laws, policies, and standards applicable to this type of proposed action.

3. **SHOULD DNRC PREPARE AN ENVIRONMENTAL IMPACT STATEMENT (EIS)? - No**

Based on the following, I find that an EIS does not need to be prepared:

- The EA adequately addressed the issues identified during project development and displayed the information needed to make the decisions.
- Evaluation of the potential impacts of the proposed Young Sophie Timber Sale Project and issuance of a LUL to DFWP indicates that no significant adverse impacts would occur.
- The ID Team provided adequate opportunities for public review and comment. Public concerns were incorporated into the project design and analysis of impacts.

Robert L. Sandman

Unit Manager
Stillwater/Swan River State Forests
January 31, 2003

ENVIRONMENTAL ASSESSMENT AND DECISION NOTICE FOR THE YOUNG CREEK STREAM RESTORATION PROJECT

February 7, 2003

Project Proposal and Justification:

Young Creek is one of the most important westslope cutthroat trout spawning tributaries in the Montana Portion of the Kootenai River drainage because it represents one of the last know genetically pure populations of westslope cutthroat trout in the region and it is also one of the most potentially productive tributary streams to Koocanusa Reservoir. Young Creek also provides water for agriculture and other riparian dependent resources. The proposed stream restoration project is located on a portion of Young Creek that has been severely impacted by previous land management activities including channel manipulation, livestock grazing, timber management, and road construction. As a result, lower Young Creek is currently unable to adequately transport stream flow and bedload supply and still maintain a stable channel. The proposed project area on Young Creek is over-widened, contains several mid-channel gravel bars, and is not in equilibrium with sediment deposition and transport. The current condition of the proposed project area provides poor habitat for native salmonids.

Montana Fish, Wildlife and Parks (FWP) will stabilize approximately 1,200 feet of Young Creek and enhance habitat for adult and juvenile westslope cutthroat trout. The project will re-align and reshape the channel to an appropriate dimension, pattern and profile, installing log and rock vanes and rootwads throughout the project, and planting native vegetation along the riparian corridor to provide long-term stability to the stream banks. The intent of the project is to: 1) Reduce the sediment sources and bank erosion throughout the project area by incorporating stabilization techniques that function naturally with the stream and decrease the amount of stress on the stream banks, 2) Convert the channelized portions of stream into a channel type that is self maintaining and will accommodate floods without major changes in channel pattern or profile, 3) Use natural stream stabilization techniques that will allow the stream to adjust slowly over time and be representative of a natural stream system, 4) Improve fish habitat, particularly for cutthroat trout trout, 5) improve the function and aesthetics of the river and adjacent riparian ecosystem, and 6) Reduce the effects of flooding on adjacent landowners.

Location of Project:

This project will be conducted on lower Young Creek located approximately 11 miles northwest of the town of Eureka, located entirely within a section of state owned land, in the NE ¼of Section 16, T37 N, R28W, in Lincoln County.

Environmental and Social Impacts of Project:

Implementation of the stream restoration project should result in long-term sediment reduction from the three sources currently contributing sediment to lower Young Creek; stream instability resulting from improper functioning condition, cattle grazing and associated impacts, and motorized vehicle impacts at the ford crossing. These reductions should translate into a substantial positive improvement for fish populations and fisheries habitat within lower Young Creek.

There will be short-term increases in turbidity during the project construction phase. During construction, all reasonable and applicable best management practices will be employed to minimize sedimentation to Young Creek. For example, we will minimize short-term turbidity by 1) scheduling construction to occur during a low flow period; 2) construction of the new stream channel will occur mostly in the dry, prior to routing water through the newly constructed channel; 3) using pumps to dewater areas as necessary during construction of bank revetment and instream structures; and 4) filtering water across vegetated floodplain areas that drain away from the active channel during construction. We expect that any short-term increases in turbidity will not significantly adversely impact the aquatic biota within Young Creek.

We expect that any short-term impacts associated with this project will be mitigated by the long-term benefits. Soils along the stream margin would be disturbed during channel construction, but would quickly stabilize following proposed re-vegetation efforts. Overall, the project is expected to reduce bank erosion and improve channel stability by restoring a degraded portion of the channel to a proper dimension, pattern and profile and reestablishing a healthy riparian zone. Likewise, riparian vegetation and cover would experience minor disturbance during the period of construction. However, proposed re-vegetation efforts would ultimately improve the riparian community and the overall aesthetics within this area. One of the major objectives of this project is to improve rearing and migration conditions for native salmonids in Young Creek. We expect that these restoration efforts and associated instream structures will provide stream gradient control, fish habitat, and interim protection of reconstructed streambanks. The project will improve salmonid rearing and migration conditions by increasing the frequency and quality of pool habitat, stabilizing eroding stream banks and shifting stream channels, lowering summer water temperatures, and increasing the abundance and complexity of instream

cover. These habitat improvements may increase the long-term carrying capacity and productivity of local populations of westslope cutthroat trout.

Public Involvement:

In compliance with the Montana Environmental Policy Act, in August 2002, a scoping letter was sent out to property owners on lower Young Creek, local conservation groups, local timber companies, selected businesses, and natural resource agencies. No public comments were received during this process. Upon completion of the EA and this Decision Document, an additional 30-day comment period will be enacted to provide additional opportunity for public and internal comment on the project and environmental assessment. This decision document will be amended to address any comments received during that period.

Decision notice:

I find that an Environmental Impact Statement (EIS) does not need to be prepared for this project because 1) The Environmental Assessment adequately addressed the issued identified during project development and displayed the information needed to make informed decisions, 2) The evaluation of the potential impacts of the proposed stream restoration project indicated that no significant adverse impacts will occur, and 3) The public scoping process provided adequate opportunities for public review and comment, which were incorporated into the project design and analysis of the impacts.

Therefore, based on the comments we received during the public comment period for the draft environmental assessment for the Young Creek Stream Restoration Project, FWP has prepared the final environmental assessment for the restoration project. Due to the urgent need to improve native salmonid rearing and migration habitat, reduce sedimentation, and promote bank stability in lower Young Creek, I recommend that the proposed project be implemented as needed.

2/11/03

Dan Vincent, Region One Supervisor — Date
MT Fish, Wildlife & Parks

TABLE OF CONTENTS

YOUNG/SOHPIE TIMBER SALE AND STREAM RESTORATION PROJECT

CHAPTER I

PROPOSED ACTIONS AND OBJECTIVES

INTRODUCTION TO PROPOSED ACTIONS

Stillwater State Forest, Montana Department of Natural Resources and Conservation (DNRC) and Montana Department of Fish, Wildlife, and Parks (DFWP) are proposing the Young/Sophie Timber Sale and Stream Restoration Project. The DNRC-proposed timber sale would harvest between 750 thousand board feet (MBF) and 1.6 million board feet (MMBF) of timber on approximately 1,128 acres. Roadwork would consist of approximately 0.6 mile of new construction, 4 miles of reconstruction, and 2.5 miles of road abandonment on the project area in the Young Creek section. Roadwork on the Sophie Lake section would consist of approximately 1.25 miles of drainage improvements and 1 mile of temporary road construction.

DFWP is proposing a channel-restoration project for a portion of Young Creek in the northeast portion of the State's Young Creek section (Section 16, T37N, R28W). During the 1950s, the stream channel was straightened and a levee was built along the edge of the field. The restoration project would construct 1,600 feet of stream channel that is designed to properly and efficiently transport sediment, allowing the channel to maintain itself through time. Approximately 1,200 feet of the current channel would be reclaimed.

The proposed stream restoration are located within portions of Section 16, T37N, R27W (Sophie Lake) and Sections 16 and 17, T37N, R28W (Young Creek). The proposed areas are located approximately 5 (Sophie Lake) and 10 (Young Creek) air miles northwest of Eureka, Montana (see *VICINITY MAP*, back of front cover).

Project activities are scheduled to begin in the spring or summer of 2003.

PURPOSE OF PROPOSED ACTION

The lands involved in the proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions, such as public schools, State colleges and universities, and other specific State institutions, such as the School for the Deaf and Blind (*Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11*). The Board of Land Commissioners (Land Board) and DNRC are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (*Section 77-1-202, Montana Codes Annotated [MCA]*). On May 30, 1996, DNRC released the Record of Decision for the State Forest Land Management Plan (SFLMP). The Land Board approved the SFLMP's implementation on June 17, 1996. The SFLMP is a programmatic plan that outlines the

management philosophy of DNRC on State forested trust lands and sets out specific Resource Management Standards for 10 resource categories.

The Department will manage the lands involved according to the philosophy and standards in the SFLMP, which states:

> *Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream… In the foreseeable future, timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives.*

PROPOSED OBJECTIVES

In order to meet the goals of the management philosophy adopted through a programmatic review of the SFLMP, DNRC and DFWP have set the following specific project objectives:

- Harvest 0.75 to 1.6 MMBF of sawtimber to generate revenue for the appropriate school trusts. The timber sale would also provide a sufficient amount of sawlog volume to contribute to the sustained yield for DNRC, as mandated by State Statute 77-5-222, MCA.

- Alleviate past problems, such as the potential for increased flooding, lateral bank scouring, and increased sediment supply, on a 1,200-foot section of Young Creek that has been confined, straightened, and levied for over 50 years. The proposed action to construct a new stream channel with proper and engineered dimensions, patterns, and profile would achieve this objective. The new stream course would efficiently transport sediment and maintain itself through time and serve to stabilize streambanks and enhance fisheries habitat. (See the DFWP assessment in *APPENDIX B - YOUNG CREEK BANK STABILIZATION AND FISHERIES HABITAT IMPROVEMENT PROJECT*.)

- Assure that the long-term monitoring and maintenance of the stream project are consistent with State and Federal water-quality laws and the management philosophies of trust land. To perform the stream restoration project, DNRC would issue a Land Use License to DFWP that addresses the stipulations and specifications required of the licensee over the long-term.

- Improve the long-term productivity of timber stands by increasing stand vigor, reducing incidence of insect infestations and disease infections, and regenerating portions of the stands where timber-stand growth is decreasing. Actions would be done in a manner that would maintain the productivity of the sites and favor the retention and regeneration of appropriate species mixes.

- Reduce the risk of catastrophic fire to State trust lands and adjacent landowners by reducing forest fuel loadings.

- Provide for additional benefits and maintain options for sustained revenue to the school trusts by completing site improvements on existing roads to improve drainage, water quality, and safety as recommended by current Best Management Practice (BMPs) Standards for Forestry.

ENVIRONMENTAL ASSESSMENT (EA) PROCESS

This EA was prepared in accordance with the Montana Environmental Policy Act (MEPA), which requires State government to include the

consideration of environmental impacts in its decisionmaking process and inform the public and other interested parties of the proposed projects, the environmental impacts that may result, and the alternative actions that could achieve the project objectives.

SCOPE OF THE PROPOSED ACTION

Management actions associated with the Young/Sophie Timber Sale and Stream Restoration Project are limited to actions needed for implementation of the proposed project and the measures identified for resource protection in this analysis. The proposed Young/Sophie Timber Sale and Stream Restoration Project EA is site specific and is not a general management plan or programmatic analysis of the area. The scope of the analysis was determined through public involvement and a DNRC interdisciplinary team (ID Team) approach.

SCOPING

DNRC sought comments and concerns by advertising the initial project proposal in the Tobacco Valley News on May 1998 and mailing the proposal to adjacent landowners, interested individuals, and the staff members of DNRC and DFWP.

The public comment period for the initial project proposal was open for 30 days. Comments from 7 groups or individuals were received. The issues and concerns identified through the public scoping were summarized and used to further refine the project.

The sale was originally scheduled for completion in 2000; however, changes in the status of other DNRC timber sales postponed the completion date of the Young/Sophie Timber Sale Project to 2001.

By November of 1999, the ID Team, which is made up of DNRC's wildlife biologist, hydrologist, archaeologist, road engineer, and foresters, further defined an action alternative.

A newsletter was sent out in November of 1999 to solicit additional comments from the public and keep them informed of the status of the project. Other timber sale priorities, combined with the severe fire seasons of 2000 and 2001, postponed the Young/Sophie Timber Sale Project to the present.

A group of DFWP specialists met with DNRC foresters and worked with DNRC hydrologists in their proposal to restore the channel on portions of Young Creek in July 2002. A letter, including maps and the DFWP proposal, was sent out to adjacent landowners and groups/persons who had responded to the initial proposal in August 2002. The mailing list developed for this project is located in the project file.

Throughout the EA process, public comment is taken into consideration. Comment and concerns specific to this project are summarized at the end of this chapter.

DECISIONS TO BE MADE

The following decisions are to be made as a result of this EA and will be incorporated into the Finding.

- Do the alternatives presented meet the project objectives?
- Does the selected alternative have significant effect(s) on the human environment?
- Should an Environmental Impact Statement (EIS) be prepared?
- Which alternative or portions of the alternatives should be implemented?

EA REVIEW AND TIMBER SALE PROCESS

Upon completion of the EA and Finding, DNRC allows a 30-day comment period to consider public and internal input on the project and assessment. The decisions

presented with this document related to the timber sale will become recommendations by DNRC to the Land Board. Ultimately, the Land Board will make the final decisions regarding which alternative or portions of alternatives to implement for the timber sale. The decision to issue a Land Use License and implement the stream restoration portion of the action alternative will be addressed by either DNRC or DFWP in their Findings.

OTHER AGENCIES WITH JURISDICTION/ PERMIT REQUIREMENTS

LINCOLN COUNTY CONSERVATION DISTRICT

A 310 Permit would be required in accordance to the Montana Natural Streambed and Land Preservation Act. This permit is required for activities that physically alter or modify the bed and banks of a stream.

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

A Short-term Exemption from Montana's Surface Water Quality Standards (318 Authorization), issued by the DEQ, may be required if temporary activities would introduce sediment above natural levels into streams.

MONTANA AIRSHED GROUP

DNRC is a member of the Montana Airshed Group, which regulates slash burning done by DNRC. DNRC receives an air-quality permit through participation in the Montana Airshed Group.

UNITED STATES FOREST SERVICE

Commercial log hauling on USFS-owned roads requires a Temporary Road Use Permit (TRUP) from the Rexford Ranger District, Kootenai National Forest (KNF).

UNITED STATES ARMY CORPS OF ENGINEERS

A 404 Permit for the Federal Clean Water Act is required where fill material may be placed in the water.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

The enforcement and regulatory review of the 404 Permit is handled by this agency.

REFERENCED DOCUMENTS

Other referenced EAs and documents that supplement the analysis and influence the scope of this EA are:

- Young J Fire Rehabilitation EA, USFS, KNF, Rexford Ranger District, 2002.
- Checklist EA, Eureka North Block E Prescribed Burn, March 1998, Stillwater State Forest.
- Biological Evaluation For Sensitive Terrestrial Species, DNRC Access Special Uses Permit, USFS, KNF, Rexford Ranger District, July 2002.
- Biological Assessment for Threatened, Endangered, and Proposed Terrestrial Species, DNRC Road Access Special Use Permit, USFS, KNF, Rexford Ranger District, July 2002.
- Biological Assessment for Threatened and Endangered Fish Species, Young J Environmental Assessment, Young Creek Permanent Road Access Request (Federal Road and Trail Act [FRTA]), USFS, KNF, Rexford Ranger District, August 2002.
- Dog/Meadow EA, DNRC, Stillwater State Forest, January 2003
- Memo of Understanding, DFWP and DNRC, December 2002.
- Decision Memo for Road Use Permit (Road 303b), USFS, Rexford Ranger District, September 2002

RESOURCE CONCERNS ASSOCIATED WITH THE PROPOSAL

Through the public involvement process and interdisciplinary approach used to develop this project, concerns about the potential impacts of initiating this

project were identified. DNRC and DFWP used these concerns in their final design of the project. The project is described in *CHAPTER II - ALTERNATIVES*. Mitigation measures (*APPENDIX A–STIPULATIONS AND SPECIFICATIONS)* are a part of the project design that would be incorporated to reduce or prevent the risk of resource impacts.

Concerns, as they relate to the proposed Young Sophie Timber Sale and Stream Restoration Project, are presented below by resource. Most of these concerns or issues are further addressed and analyzed in *CHAPTER III - EXISTING CONDITIONS AND ENVIRONMENTAL CONSEQUENCES*.

Wildlife

- Maintaining grassland habitat for Columbian sharp-tailed grouse and elk winter range on the Sophie Lake section over the long-term is a concern.
- Concern was also raised about maintaining thermal cover for white-tailed deer on the Young Creek Section.
- That improved road systems may cause a loss of habitat security for wildlife species on both sections of trust lands was an expressed concern.
- A concern was expressed that fencing along riparian areas may reduce big game movement or increase big game mortality.

Vegetation

- Concerns were brought up that timber harvesting could alter the composition and diversity of tree species.
- That portions of grassland and young timber stands that have been growing within the grassland boundaries could be affected by the prescribed burning methods was a concern.
- A voiced concern was that logging slash could affect forest fuel loadings and add additional wildfire hazards.
- Concerns were raised about the possibility that logging, heavy equipment, and vehicle traffic could establish or spread noxious weeds on disturbed areas.
- One concern was that the harvesting of trees and removal of overstory canopy is needed on the Young Creek section to improve the growth of grasses and forbs.
- That an existing crop of young trees would be killed from the prescribed burn was a concern.
- Concerns about sensitive plant and old-growth were expressed. Sensitive plant and old-growth verification surveys have been conducted on these 2 sections. No sensitive plants or old growth, as defined by DNRC, were found. No further analysis will be required.

Hydrology and Fisheries

- Short- and long-term increases in sedimentation from timber harvesting, road construction activities, excavation of a new stream channel, and reclamation of the existing channel are concerns.
- The changes in sediment deposition and the effect to fisheries habitat are concerns.
- A concern was raised that the channelization project from the 1950s has led to a general lack of salmonoid fisheries habitat complexity in a 1,200-foot portion of Young Creek.

Soils

There is a concern that ground-based harvesting activities will cumulatively decrease soil productivity, primarily through soil compaction and displacement.

Economics

- A concern was expressed that the low harvest volume per acre, the

value of the logs to be harvested, and the costs of road development may not be conducive to an economical timber sale proposal.

- A concern is that the proposal to broadcast burn slash may be more costly than other methods of slash disposal.
- Concerns were expressed that there may be a potential for DNRC's Trust Land Division to incur some of the long-term costs of monitoring or maintenance associated with the Young Creek Restoration Project.

Access

- There is concern that access routes to State ownership be considered for long-term interests in trust land management. In *ALTERNATIVE ACCESS ROUTES CONSIDERED* in *CHAPTER II - ALTERNATIVES*, DNRC provides additional information on transportation planning for the Young Creek section.
- Some individuals expressed the need for more road restrictions, while others would prefer no additional restrictions. As described in *CHAPTER II - ALTERNATIVES* the project proposes to continue vehicle restrictions within the Sophie Lake section and implement vehicle restrictions within the Young Creek section. Additional information on the costs and benefits of this action may be found in *CHAPTER III - EXISTING ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES* under the various resource descriptions and expected effects to those resources.

YOUNG/SOHPIE TIMBER SALE AND STREAM RESTORATION PROJECT

CHAPTER II

ALTERNATIVES

INTRODUCTION

The purpose of Chapter II is to, first, describe the no-action alternative and action alternative in relation to the timber-harvesting activities on the Sophie Lake and Young Creek sections and the stream-restoration project on lower Young Creek. Secondly, *TABLE II–1 - SUMMARY OF ENVIRONMENTAL EFFECTS* summarizes the detailed environmental analyses from *CHAPTER III - EXISTING ENVIRONMENTAL AND ENVIRONMENTAL CONSEQUENCES*.

The action alternative was developed to meet the project objectives and is a direct result of public scoping, site-specific reviews, and specialist input. The ID Team and DNRC's road engineer developed the transportation section of the action alternative.

DESCRIPTION OF ALTERNATIVES

- ***No-Action Alternative A***

  No timber harvesting, broadcast burning, fuels reduction, or road construction would be implemented on the Sophie Lake or Young Creek sections under No-Action Alternative A. The natural process of stand development, mortality, regeneration, and fuel buildup would still occur within the timber stands. The area would continue to experience unrestricted road use, firewood cutting, recreational use, and fire-suppression activities.

  Under this alternative, the segment on lower Young Creek would remain in its current condition. In the 1950s, a portion of Young Creek on State land was rerouted, straightened, and confined by a levy. Under this alternative, the channel would not be relocated to its historic location or attain a natural channel pattern or profile in the near future.

  Leases for cattle grazing and other agricultural uses would continue on Young Creek section. Current plans are to have the lessee reconstruct the western fenceline boundary in 2003 under the Grazing Management Plan.

  No-Action Alternative A serves as a baseline to compare changes resulting from Action Alternative B. A complete description of the existing environment and effects of No-Action Alternative A is presented in *CHAPTER III - EXISTING ENVIRONMENT and ENVIRONMENTAL CONSEQUENCES*.

- ***Action Alternative B***

  Several actions are proposed under Action Alternative B that would affect the natural process of stand development, regeneration, fuel buildup, and road use within both the Sophie Lake and Young Creek sections of trust land. The channel restoration of a portion

of Young Creek within DNRC's ownership is also proposed under this alternative.

The Sophie Lake and Young Creek sections are 2 separate parcels of land, and, because of major differences in these parcels, the timber- and road-management activities and stream-restoration project will be described by geographic area. The vicinity map on the back of the front cover shows the geographical differences between these sections. Maps for each portion of the project are included in this chapter. In addition to the following project description, the mitigations specified in *APPENDIX A - STIPULATIONS AND SPECIFICATIONS* provide more detail related to specific resources associated with the project.

➢ Sophie Lake Section

TIMBER-MANAGEMENT ACTIVITIES

An improvement-cut harvest over approximately 250 acres would remove 300 to 600 MBF of timber. This harvest treatment would:

- remove trees that are at high risk for value loss and mortality from dwarf mistletoe, bark beetles, root rot, etc;
- favor ponderosa pine trees displaying good form and vigor for retention;
- create small openings up to 1 acre in size to allow established advanced regeneration to release or new seedlings to regenerate; and
- leave trees in the harvest units for snag retention and snag recruitment.

Approximately 350 acres would be broadcast burned to reduce fire hazards by reducing the existing duff, natural fuel buildup, and harvest-generated logging slash. The prescribed fire would also help regenerate the ponderosa pine species and rejuvenate the bunchgrasses that are associated with the mixed grasslands this site is capable of supporting. The area proposed for broadcast burning is west of the existing road as displayed in *FIGURE II-1 - HARVEST MAP OF THE SOPHIE LAKE SECTION*.

The broadcast burning proposal is dependent upon funding, timing, availability of personnel, cooperative efforts with other agencies and foundations, and the weather. If the broadcast burning efforts do not come together, the slash generated from logging would be piled and burned.

ROAD-MANAGEMENT ACTIVITIES

The current road closure at the southern boundary of the section would be maintained. Motorized access to this section is across private land from the south. The access is granted for forest management and fire control on State trust land. The Sophie Lake section has 1.25 miles of roads that would be improved to meet BMPs and grass seeded and fertilized to reduce the chance of weed establishment on the disturbed areas. Approximately 1 mile of temporary road would be built; these roads would be reclaimed after the prescribed burning is completed.

➢ Young Creek Section

TIMBER-MANAGEMENT ACTIVITIES

A seedtree with reserves harvest treatment over 56 acres and an improvement-cut harvest treatment over 450 acres would remove between 750 MBF and 1.25 MMBF of timber.

The harvest units using a seedtree with reserve treatment would range in size from 4 to 15 acres; all merchantable timber would be cut, with the exception of:

FIGURE II-1 - HARVEST UNITS ON SOPHIE LAKE SECTION, SECTION 16, T37N, R27W

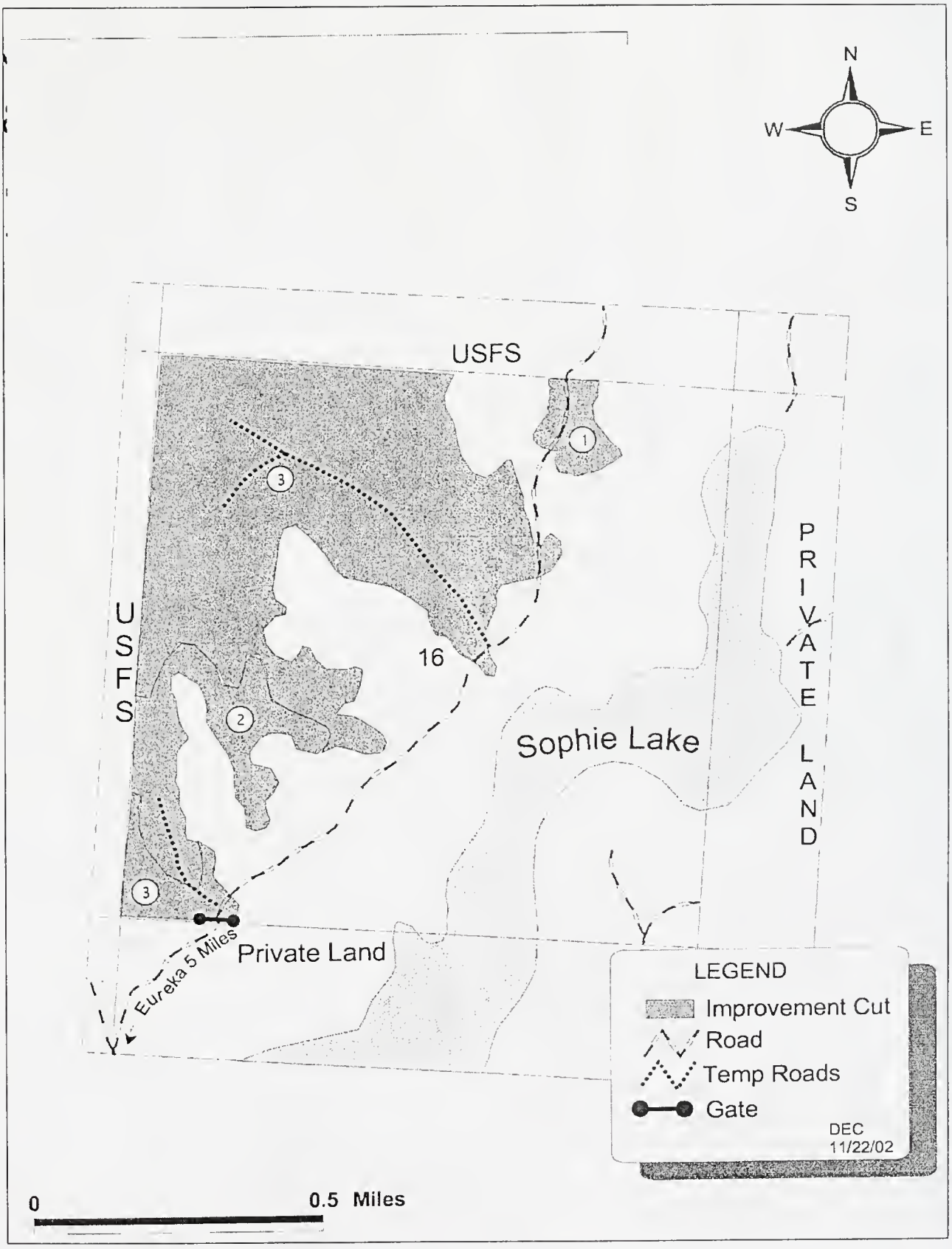
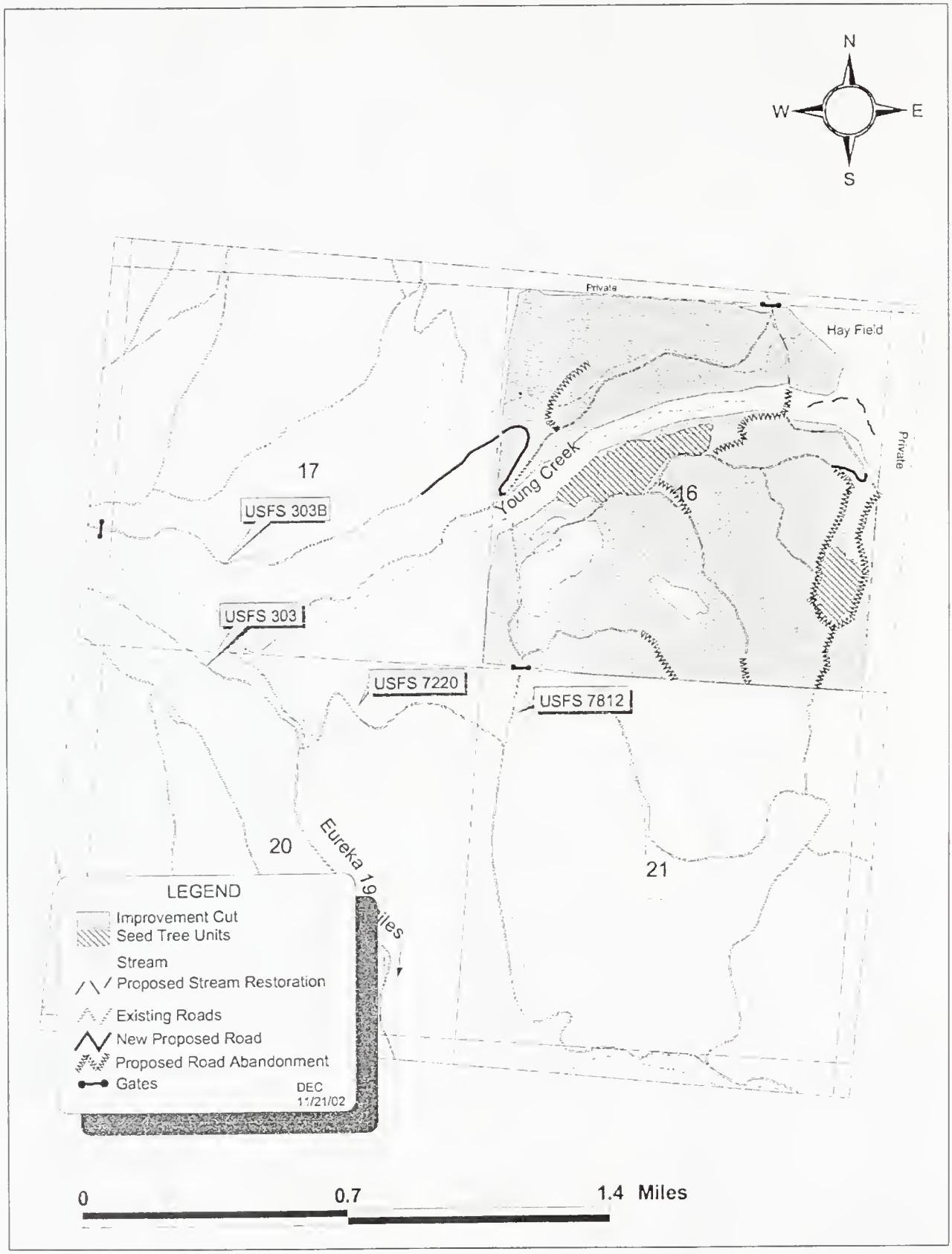


FIGURE II-2 - HARVEST UNITS ON YOUNG CREEK SECTION, SECTION 16, T37N, R28W



- 4 to 10 of the larger-diameter western larch/Douglas-fir/ ponderosa pine per acre that show vigorous growth, healthy crowns, and the potential to produce healthy cone crops; and

- 2 to 4 trees per acre over 21 inches dbh, where possible, would be reserved for snag retention and snag recruitment.

Douglas-fir and western larch would be expected to regenerate in these openings. Ponderosa pine would be interplanted following machine scarification. In addition to increasing species diversity, a seedling-sized class would be added to the stand structure.

The improvement-cut harvest units would range in size from 18 to 200 acres and consist of commercial thinnings and improvement cuts. This harvest treatment would:

- remove trees that are at high risk for value loss and mortality from dwarf mistletoe, bark beetles, root rot, etc;

- create small openings up to 1 acre in size to allow established advanced regeneration to release or new seedlings to regenerate;

- leave patches of timber for wildlife hiding cover throughout the units where the amount of merchantable timber that could be removed makes operations uneconomical; and

- retain trees in the harvest units for snag retention and snag recruitment.

Hazard reduction for logging slash would meet the State Hazard Reduction Law. Specifically, areas within 1,000 feet of a residential structure would meet the High Standard specifications under this law. Around the perimeter of the harvest unit, the entire harvested tree, including tops and branches, would be removed to the landing site in these areas.

ROAD-MANAGEMENT ACTIVITIES

While analyzing the State transportation system, the decision was made to no longer use the existing ford on Young Creek. Young Creek is inhabitated by westslope cutthroat trout and the levels of sediment caused by fording the creek cannot be kept to minimums. Additionally, the potential for installing a temporary bridge over the creek is hampered by the road systems within the State section. This system has tight curves and steep grades that are not conducive to transporting a 40-foot bridge. Therefore, without a crossing location on Young Creek, access would be necessary from both the south and north sides of Young Creek.

USFS Road 7812 was chosen for use in this project to access the area that lies south of Young Creek because BMP standards could be met with the least soil disturbance and cost and less maintenance would be needed over the long term.

The old northern access, which was utilized in the early 1970s for a State timber sale project, is not a viable option because the road cannot be brought up to BMP standards. Therefore, the decision was made to access the north half of the Young Creek Section via USFS roads 470, 303, and 303B. DNRC would extend Road 303B by constructing an additional 1,000 feet of road on USFS ownership and 1,200 feet on State ownership.

USFS owns most of the roads leading into this section, including the bridge that crosses Lake Koocanusa. A TRUP from USFS is required to access the Young Creek section. In the TRUP, such

road-maintenance items as road grading and applying magnesium chloride to abate dust on 7 miles of road are required. The road improvements specified in the TRUP are:

- construct drive-through drain dips on USFS roads 303B, 7220, and 7812;
- brush and clear segments of USFS roads 303B and 7812;
- grass seed disturbed areas;
- install and maintain a gate closure at the junction of USFS roads 303 and 303B; and
- construct, to USFS specifications, 1,000 feet of new road, 12 feet wide, from the end of Road 303B to the western boundary of Section 16.

On the State section an additional 1,800 feet of new road would be constructed and approximately 4 miles of road would be reconstructed. The reconstruction improvements on the State section would include:

- widening the existing road to a width that would allow safe travel during logging operations; and
- constructing drainage features to meet BMP standards, such as drain dips to remove water from the road surface.

This action alternative would abandon approximately 2.5 miles of roads by adding water bars and spreading slash on the roads to reduce erosion. The ford on Young Creek would be closed with stumps, slash, and rocks.

Gates would be installed near the southwest corner of this section where USFS Road 7812 meets the section line and on the north section line where the road enters the section from private land. These gates would restrict road use, thereby protecting DNRC's investments in their roads.

YOUNG CREEK CHANNEL RESTORATION

DFWP is proposing to restore a portion of Young Creek that had been rerouted, straightened, and confined within a levy during the 1950s. Construction of a new channel to engineered dimensions, patterns, and profile specifications are proposed; the current channel would also be rehabilitated.

According to DFWP's proposal, the project would move the channel away from the hillside and back into the historic channel location within the open fields, but not within the hay field. Designs show the stream gradient would be decreased from 1.6 to 1.2 percent and the stream length increased from 1,200 feet to 1,600 feet. Several structures consisting of logs, rootwads, and large rocks would be installed in the new channel for stabilization of the streambanks and improvement of fisheries habitat.

In the long term, vegetation would be the primary mechanism for bank stabilization. Excavated streambanks would be vegetated with shrubs and native grasses and armored with large-diameter logs, root wads, and rocks. Reclamation of the existing channel would require dewatering, spreading excess soil from the new excavation into the old channel, and planting native trees, shrubs, and grasses.

To help ensure recovery of the site, fencing would be installed around both the old and new channels. Annually, DFWP personnel would monitor channel recovery, channel morphology, and fish populations.

For additional information please review *APPENDIX B - YOUNG CREEK BANK STABILIZATION AND FISHERIES HABITAT IMPROVEMENT PROJECT.*

FIGURE II-3—YOUNG CREEK RESTORATION PROJECT, SECTION 16, T37N, R28W

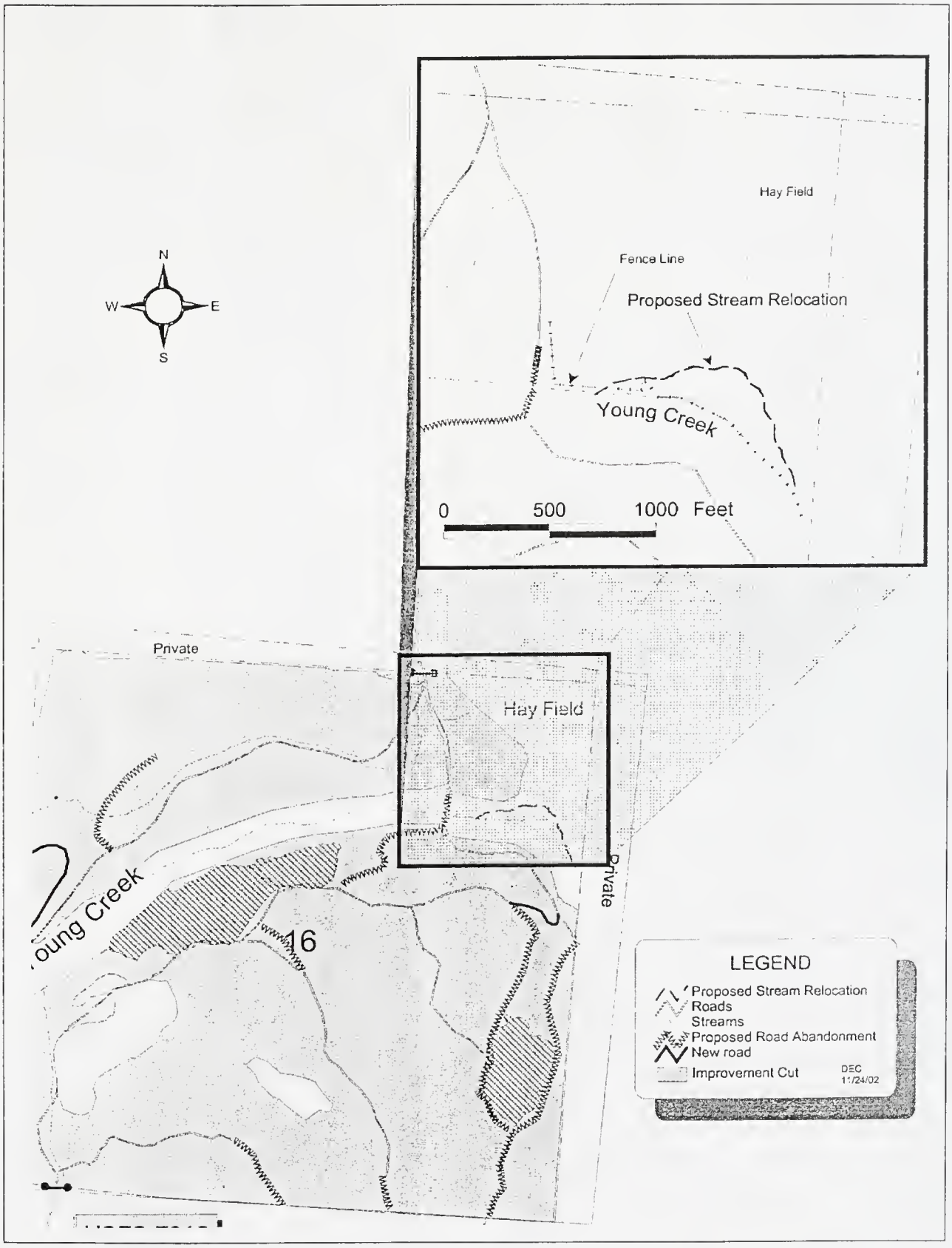


TABLE II-1—SUMMARY OF ENVIRONMENTAL EFFECTS

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
Wildlife		
Coarse filter for the habitat of all species	***No Action Alternative A***	
	Sophie Lake Section – The stands proposed for treatment would not be harvested and would continue to convert to closed, dense stands, which would reduce understory vegetation. The aspen stand would continue to decline and convert into a coniferous stand; ponderosa pine would continue to encroach on the grasslands. This alternative would favor species that use close-canopied forested habitats and negatively affect species that use the forest conditions that are more open.	The surrounding landowners used a combination of logging and prescribed fire to achieve more historical conditions. This alternative does not contribute to moving the area toward conditions that would be expected historically.
	Young Creek Section – The stands would be denser and contain more shade-tolerant tree species than expected historically. This alternative would favor species that use close-canopied forested habitats and negatively affect species that use the more-open forest conditions, understory vegetation, and aspen and grassland communities for a portion of their life requirements.	
	Action Alternative B	
	Sophie Lake Section – This alternative would reduce stocking densities, increase understory vegetation growth and diversity, and rejuvenate quaking aspen and grassland communities. The vegetation communities would be moved toward historic conditions and aspen and grassland communities would rejuvenate, thereby increasing wildlife habitat diversity in the area.	The surrounding landowners used a combination of logging and prescribed fire to achieve more historical conditions. This alternative would contribute to moving the area toward conditions that would be expected historically; however, some areas could be stocked at a lower density.
	Young Creek Section – This alternative would reduce stocking densities, favor larger shade-intolerant tree species, and increase understory vegetation growth and diversity. It is also expected to benefit native species by reproducing stand conditions to which native species are adapted.	

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
Wildlife- Threatened and Endangered Species		
Bald eagle	***No-Action Alternative A***	
	Sophie Lake and Young Creek Sections – Bald eagles and their habitat would not be affected by this alternative.	Bald eagles and their habitat would not be affected by this alternative.
	Action Alternative B	
	Sophie Lake Section – Timber harvesting activities are not expected to affect bald eagles if they continue to nest in their current location. Timber harvesting would not affect the nesting or primary use area, and timber modifications would retain and/or facilitate development of beneficial habitat qualities. No effects to minor positive effects would be expected under this alternative.	No other DNRC activities are planned in the home-range area. Therefore, modification of eagle habitat is not expected over the effects discussed in the Sophie Lake section of the wildlife analysis.
	Young Creek Section – No direct impacts are expected.	
Grizzly bear	***No-Action Alternative A***	
	Sophie Lake and Young Creek Sections – Grizzly bears and their habitat would not be appreciably affected under this alternative.	This alternative would not appreciably affect grizzly bear habitat.
	Action Alternative B	
	Sophie Lake Section – The increased disturbance would further reduce the already low probability of a grizzly bear using the area while project activities are ongoing.	This alternative would not appreciably affect grizzly bear habitat, although it would slightly increase the amount of habitat, including forage availability.
	Young Creek Section – Timber harvesting would alter grizzly bear habitat. The proposed project could increase herbaceous and, possibly, carrion availability, which could benefit grizzly bears by increasing food availability.	

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
Wildlife – Sensitive Species		
Columbian sharp-tailed grouse	***No Action Alternative A***	
	Sophie Lake Section – No displacement or mortality of Columbian sharp-tailed grouse are expected under this alternative. Sharp-tailed grouse habitat is expected to decrease as forests encroach into the grasslands.	Cumulatively, habitat for this species would decline in the area.
	Young Creek Section – No effects are expected.	
	Action Alternative B	
	Sophie Lake Section – The existing grasslands would be partially reclaimed by harvesting and prescribed burning following harvesting under this alternative. These treatments would remove a portion of encroaching trees and rejuvenate grasses, thereby increasing the amount and quality of Columbian sharp-tailed grouse habitat.	Habitat for Columbian sharp-tailed grouse would increase in the area.
	Young Creek Section – No effects would be expected.	
Flammulated owl	***No Action Alternative A***	
	Sophie Lake Section – Flammulated owl habitat would be expected to decrease as tree densities increase.	Untreated areas around the project areas are expected to undergo similar processes discussed under this alternative. However, treatments around both sections have likely enhanced habitat conditions for flammulated owls.
	Young Creek Section – Flammulated owl habitat would be expected to decrease as tree densities increase and ponderosa pine trees die out of the stands.	

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
Wildlife – Sensitive Species (cont.)		
Flammulated owl (cont.)	***Action Alternative B***	
	Sophie Lake Section – Important structure (snags and seedtrees) would be retained for future habitat. The commercial thin/improvement harvests would likely enhance flammulated owl habitat by reducing tree density while retaining large trees and snags for short-term habitat. This treatment is expected to produce beneficial effects in the short and long terms.	These beneficial effects would combine with adjacent treatments to expand the amount of habitat in and around the project area.
	Young Creek Section – Under this alternative, the proposed seedtree treatments would likely result in unsuitable habitat, but important structure (snags and seedtrees) would be retained for future habitat. The commercial thin/improvement harvests would likely enhance flammulated owl habitat by reducing tree density while retaining large trees and snags for short-term habitat and regenerating ponderosa pine in pockets to provide habitat into the future. These treatments are expected to produce beneficial effects in the short and long terms.	
Fisher	***No-Action Alternative A***	
	Sophie Lake Section – No effects would be expected.	No projects are ongoing or planned in the upper stretches of Young Creek; therefore, no changes in fisher habitat are expected under this alternative.
	Young Creek Section – Fishers or their habitat would not be affected under this alternative. Motorized access would continue to allow a reduction in fisher habitat components, primarily snags and coarse woody debris.	

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
Wildlife – Sensitive Species (cont.)		
Fisher (cont.)	***Action Alternative B***	
	Sophie Lake Section – No effects would be expected.	Important fisher habitat and movement corridors in the area are not expected to change under either alternative.
	Young Creek Section – No harvesting would occur within the riparian zone of the creek under this alternative; thereby, movement corridors and preferred fisher habitat would be retained. The stream restoration project could result in short-term displacement of fishers and a slight alternation of habitat components. The proposed road closures would reduce access on the section over time; thereby reducing the loss of fisher habitat components. Overall, the timber harvesting and associated management in this alternative is expected to result in minor positive effects to fishers.	
Harlequin duck	***No Action Alternative A***	
	Sophie Lake Section – No riparian habitat would be affected with this alternative; therefore, no effects to harlequin ducks are expected.	No other projects are occurring or planned along Young Creek; therefore, cumulative effects are not expected.
	Young Creek Section - No riparian habitat would be affected with this alternative; therefore, no effects to harlequin ducks are expected.	
	Action Alternative B	
	Sophie Lake Section – No effects would be expected.	No other projects are occurring or planned along Young Creek; therefore, cumulative risks are the same as the effects discussed in the Young Creek Section.
	Young Creek Section – The proposed timber harvesting would not disturb or alter riparian habitats along Young Creek; therefore, no effects to harlequin ducks are expected. However, the stream restoration project could affect harlequin ducks if they were using the area. Since harlequin duck use is not likely and no use has been documented, the risk of affecting harlequin ducks is low.	

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
Wildlife – Sensitive Species		
Pileated woodpecker	***No-Action Alternative A***	
	Sophie Lake and Young Creek Sections – Large trees and snags for feeding and nesting would remain in the amount present on the landscape. However, through time, few trees would attain the size required for pileated woodpeckers due to the high stocking densities.	No other projects are planned immediately adjacent to either section; therefore, pileated woodpecker habitat in the surrounding area is expected to undergo the similar processes for the project area as discussed under direct and indirect effects.
	Action Alternative B	
	Sophie Lake Section – Efforts would be made to retain large trees and existing snags, thereby minimizing snag loss. The thinning treatments may reduce competition and release the remaining trees, which would obtain large diameters in time. These treatments would provide future nesting and feeding habitats.	No other projects are planned immediately adjacent to either section. Around the Sophie Lake section, USFS and private landowners conducted some harvests and prescribed burns to achieve similar silvicultural goals. In combination with this proposal, pileated woodpecker habitat is expected to increase as the remaining trees release to attain adequate size for feeding and nesting habitat. Past harvesting presumably removed pileated woodpecker habitat, resulting in reduced habitat in the area. However, these harvest areas primarily regenerated shade-intolerant tree species and may add to pileated woodpecker habitat in the distant future.
	Young Creek Section – Efforts would be made to retain large trees and existing snags, thereby minimizing snag loss. The thinning treatments are aimed at reducing competition and releasing the remaining trees; these trees are expected to obtain large diameters in time. These treatments would provide future nesting and feeding habitat. The seedtree treatments would increase the amount of ponderosa pine and western larch on the section. Some large Douglas-fir would be removed, thereby reducing feeding opportunities for pileated woodpeckers. In the long term, the treatments would enhance pileated woodpecker habitat, while producing minimal short-term losses in feeding habitat and reduced nesting cover.	

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
Wildlife – Big Game Species		
	No-Action Alternative A	
	Sophie Lake Section – Big game habitat and security would remain unchanged. In time, forest encroachment into the grasslands would reduce forage. Additionally, the shrubs on the section would continue to age, become decadent, and/or grow out of the reach of big game species over time.	The project areas and adjacent lands would continue to increase in thermal cover, thereby continuing to reduce forage. Big game habitat, especially for elk, mule deer, and moose, is expected to decrease due to reduced forage availability. A fence along the boundary of the Young Creek section would be built to prevent livestock trespass. This fence is not expected to prevent big game use or substantially increase mortality, but is expected to reduce forage consumption by livestock.
	Young Creek Section – Forage production under the dense canopy would continue to be low. The amount of motorized use would remain constant or increase through time, thereby reducing big game security.	
	Action Alternative B	
	Sophie Lake Section – Big game habitat would be altered and thermal cover would be reduced. However, the importance of thermal cover in the area is lessened due to the low snow accumulations. Forage would be increased due to the opening up of the forest canopy and the possible prescribed fire. These changes are expected to benefit elk and, to a lesser extent, deer, except in years of heavy snow accumulations. The amount of motorized and human access would remain low (current level).	Thermal and hiding covers would be reduced; however, forage production would increase. In high snow accumulation years, the benefits realized in increased forage may be suppressed by the increased importance of snow intercept (thermal cover). The landscape around the Young Creek section provides high amounts of thermal cover; therefore, increased forage is expected to increase habitat quality in the area for big game species. A fence along the boundary of the Young Creek section would be built to prevent livestock trespass. This fence is not expected to prevent big game use or substantially increase mortality, but is expected to reduce forage consumption by livestock.
	Young Creek Section – Areas of thermal cover would be removed or reduced, thereby allowing forage to increase. Pockets of thermal and hiding cover would be retained throughout the area, especially along Young Creek. The seedtree cuts would provide forage for moose during the winter. Motorized disturbance and human access would decrease. With the proposed gating and low level of road reclamation, open-road density would drop from 6.5 miles per square mile to none.	

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
Vegetation		
Insects and diseases/ forest health	***No-Action Alternative A***	
	Sophie Lake Section - Vigor would continue to decrease, growth rates would remain slow and likely decrease. Loss of vigor would increase the risk of damage to the timber stands from insect infestations and disease infections. No prescribed burning would occur and the amount of duff accumulation would increase.	Natural processes as well as forest management would continue to dictate forest health conditions within the Stillwater State Forest administrative unit.
	Young Creek Section - Vigor would continue to decrease, and growth rates would remain slow and likely decrease. Loss of vigor would increase the risk of damage to the timber stands from insect infestations and disease infections. Dwarf mistletoe would continue to spread in western larch on this section.	
	Action Alternative B	
	Sophie Lake Section - Stocking levels would be reduced, subsequently reducing stress on the retained trees. Prescribed fire would be used to reduce the duff and accumulation of fuel loading gained through logging slash.	Any trend toward decreases in tree mortality and fuel loadings, increases in timber stand vigor, and a species mix that includes young western larch, ponderosa pine, and lodgepole pine would be in addition to areas on Stillwater State Forest that have had recent silvicultural treatments or fire disturbance.
	Young Creek Section - Stocking levels would be reduced, subsequently, reducing stress on retained trees. Through planting, the amount of ponderosa pine would be increased. Harvesting would reduce concentrations of trees infected with western larch dwarf mistletoe.	
Changes in age classes and covertypes	***No-Action Alternative A***	
	Sophie Lake Section - No changes are expected.	This alternative would not add to Stillwater State Forest's general trend of moving mixed-conifer stands into the more appropriate covertypes.
	Young Creek Section - No changes are expected. Over time, the western larch/Douglas-fir covertype would decrease, and the mixed-conifer covertype would increase. Over time, with no action and continued fire suppression, age-class distribution would become somewhat homogeneous, trending toward older age classes.	

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
Vegetation (cont.)		
Changes in age classes and covertypes (cont.)	***Action Alternative B***	
	Sophie Lake Section – No changes are expected.	Other forest-management activities now taking place on Stillwater State Forest are converting mixed-conifer stands to the western larch/Douglas-fir covertype. An estimated cumulative increase of 3 percent of the area occupied by the western larch/Douglas-fir covertype would be expected. In combination with other current timber sales on Stillwater State Forest, an approximate 1.7 percent increase in area occupied by the 0-to-39-year age class would occur.
	Young Creek Section – Approximately 56 acres would be converted to the seedling/sapling age class, with some older trees retained in the overstory. Over time, with follow-up treatments, the species mix of ponderosa pine and western larch in the project area would increase. A mosaic of stand structures and openings would be distributed throughout the project area.	
Noxious weeds	***No-Action Alternative A***	
	Sophie Lake and Young Creek Sections - Weed seed would continue to be spread by recreational users. No funding would be collected for the management of noxious weeds.	If, over time, the timber management program were greatly reduced, other sources of funding for weed management would need to be increased or the weed population on State trust lands could substantially increase.
	Action Alternative B	
	Sophie Lake and Young Creek Sections - Additional motor vehicle traffic and mineral soil exposure would occur. Equipment would be washed before logging and road maintenance activities begin. Grass seeding is another mitigation measure designed to reduce weed introduction. Forest improvement (FI) funding collected for herbicide treatment and seeding of areas disturbed by timber harvesting could, over time, reduce the weed population in the project area by establishing native species in harvest units and along roads.	The weed-management program on Stillwater State Forest, has, in cooperation with County weed-control efforts, become more active in recent years. With continued funding, the program could, over time, reduce the overall area on the forest that is occupied by noxious weeds.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
Hydrology		
Sediment delivery	***No-Action Alternative A***	
	Sophie Lake Section – No effect.	Existing sources of sediment would continue to recover or degrade, dependent on natural and preexisting conditions. Sediment loads in streams would remain at or near present levels.
	Young Creek Section – Sediment delivery from the ford on Young Creek would continue, and roads that are on the section could continue to be a source of sediment delivery to Young Creek. The full length of Young Creek would continue to be a potential for sediment delivery due to livestock use.	
	Action Alternative B	
	Sophie Lake Section – 1.25 miles of existing road would have drainage improvements installed prior to hauling. The proposed harvesting activities would not likely result in scoured stream channels.	Negative cumulative effects would not likely occur on the Sophie Lake section. On Young Creek, additional equivalent clearcut acres (ECA) would not likely cause more in-stream erosion. Road abandonment projects would reduce the potential for sediment introduction into Young Creek. The Stream Restoration Project would increase sediment delivery for the short term, but would improve Young Creek's sediment transport capabilities over time.
	Young Creek Section – Proposed harvesting activities would have a very low risk of sediment delivery to streams. Reducing the number of road miles and improving drainage on the existing road would reduce the risk of sediment introduction. Abandoning the ford and rehabilitating the site would eliminate a sediment source. On the Channel Restoration Project, a short-term increase in seasonal turbidity for up to 3 years would likely occur. The potential for sediment delivery to the new stream channel would be reduced by a vegetation plan. Fencing of the new channel area would likely result in reduced impacts from livestock use.	
Water yield	***No-Action Alternative A***	
	Sophie Lake and young Creek Sections - No effects are expected.	No cumulative effects would occur.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
Hydrology (cont.)		
Water Yield (cont.)	***Action Alternative B***	
	Sophie Lake Section - Approximately 42 ECAs would be generated from 250 acres of commercial thinning. The additional ECA would not likely result in scoured stream channels or any measurable increase in overland flow.	Negative cumulative effects would not likely occur on the Sophie Lake section. In the Young Creek watershed, the peak-flow increase would remain at approximately 11 percent. This additional ECA would not likely cause additional in-stream erosion.
	Young Creek Section – The timber-harvest treatments would generate approximately 112 additional ECAs in the Young Creek watershed.	
Fisheries		
	No-Action Alternative A	
	Sophie Lake Section – No effects are expected.	If the proposed stream-restoration project were not implemented, this portion of the creek would provide a continual source of suspended and bedload sediment to lower Young Creek and conditions would remain similar to the status quo. Any past effects to fisheries habitat on USFS land are expected to recover at a natural rate (*United States Fish and Wildlife Service [USFWS] 2002*). No cumulative effects are anticipated from the Kootenai Ecosystem Restoration and Kootenai River Wildlife Habitat Enhancements projects. No changes in fish habitat are anticipated from the proposed harvesting activities associated with the Young J Timber Sale (*USFS 2002*). Therefore, under this alternative, no additional cumulative effects to the analysis area would be likely.
	Young Creek Section – Not implementing the stream-restoration portion of the project would likely have the most substantial impacts on fish populations and fisheries habitat in Young Creek. The chronic annual supply of sediment generated within the proposed stream-restoration site would likely continue to degrade conditions in lower Young Creek. The resultant changes may result in an overall reduction in the depth and frequency of pool habitat, available cover, and the overall quality and quantity of summer and winter rearing habitat that would likely result in an overall reduction of the stream's salmonid carrying capacity. Since the proposed timber-harvesting activities would not occur under this alternative, no additional impact on fish, fish populations, or fisheries habitat would occur.	

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
Fisheries (cont.)		
	Action Alternative B	
	Sophie Lake Section – No effects would be expected.	No cumulative effects are anticipated from the Kootenai Ecosystem Restoration and Kootenai River Wildlife Habitat Enhancements projects. No changes in fish habitat are anticipated from the proposed harvesting activities associated with the Young J Timber Sale (*USFS 2002*). Increases of in-stream erosion with Young Creek as a result of the described timber-harvesting activities should also be minimal. Under this alternative, DFWP would implement the stream restoration project that would help improve the form and function of the stream channel above and below the restoration site. The result would be a reduction in annual-suspended and bed-load sediment. The net result should be an improvement in the cumulative fisheries habitat within the Young Creek watershed.
	Young Creek Section – No harvesting would occur in the SMZ. Implementation of all forestry BMPs would help assure that water quality and fisheries habitat would not be compromised as a result of timber-harvesting activities. The overall long-term impacts of this stream-restoration portion of this project are expected to have substantial beneficial impacts to the aquatic and terrestrial life in Young Creek. However, there may be short-term adverse impacts to aquatic life during the construction phase of this project. Short-term increases in turbidity would occur during project construction, especially when Young Creek is routed into the newly constructed stream channel. The proposed efforts are expected to improve pool habitat in a localized area, rearing conditions for juvenile westslope cutthroat trout, and migration conditions for adult fish.	

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
Soils		
	No Action Alternative A	
	Sophie Lake and Young Creek Sections – No effects expected.	No effects.
	Action Alternative B	
	Sophie Lake Section – Approximately 36 acres with summer logging, or 10 acres with winter logging, would be directly impacted by compaction and displacement. Within the harvest units, 4 to 15 percent of the area would be in an impacted condition following proposed harvesting activities.	Previously harvested stands would be entered. Existing skid trails would be used when appropriate. The risk of cumulative impacts to soil productivity is low.
	Young Creek Section - Approximately 76 acres with summer logging, or 20 acres with winter logging, would be directly impacted by compaction and displacement. Within the harvest units, 4 to 15 percent of the area would be in an impacted condition following proposed harvesting activities.	
Economics		
	No Action Alternative A	
	Sophie Lake Section - No revenue from timber harvesting would be generated for the trust. No FI fees would be collected.	Long-term deferral of harvesting from this forest would impact State timber sale harvest patterns, changing both the region where trees are harvested and volume taken. This will impact other areas of the State.
	Young Creek Section - No revenue from timber harvesting would be generated for the trust. No FI fees would be collected.	
	Action Alternative B	
	Sophie Lake and Young Creek Sections – Approximately $129,236 would be generated for the school trust and $83,588 for the FI account and projects. An estimated 17 jobs would be maintained with the harvest of 1.6 MMBF.	This project is part of an annual harvest of 42.164 MMBF from State trust lands. This sale is estimated to add $129,236 to the school trust fund and $83,588 to the FI account.

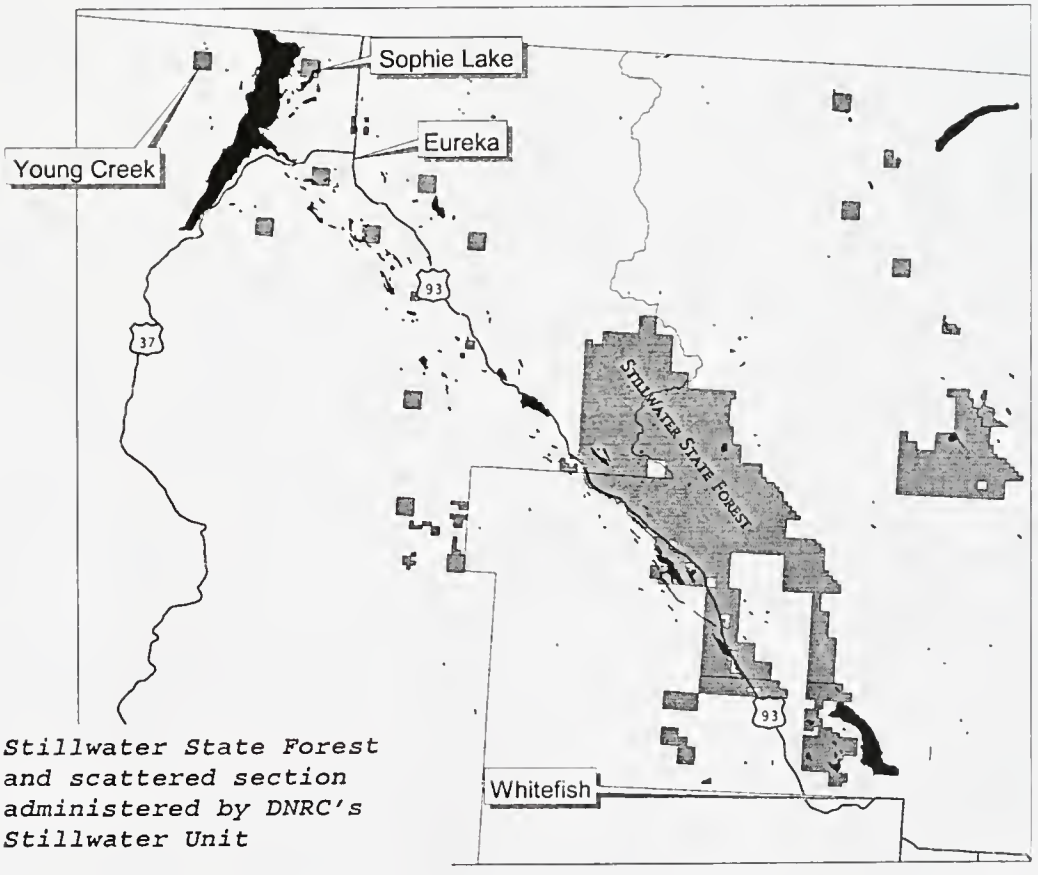
YOUNG/SOHPIE TIMBER SALE AND STREAM RESTORATION PROJECT

CHAPTER III

EXISTING ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

Chapter III contains information related to the environment on the Young Creek and Sophie Lake sections of DNRC trust lands, lands surrounding those sections, and the contiguous Stillwater State Forest. The information portrayed is related to the resource issues identified in Chapter I. Existing or current conditions discussed in this chapter include effects from current and past management and other known disturbances. The *ENVIRONMENTAL EFFECTS* section will discuss the direct, indirect, and cumulative effects that No-Action Alternative A and Action Alternative B would likely have on resources.



Stillwater State Forest and scattered section administered by DNRC's Stillwater Unit

WILDLIFE ANALYSIS

INTRODUCTION

The discussion in this section pertains to wildlife species and their habitat in the existing environment, and potential changes to that environment. During the initial scoping and subsequent newsletter comments, the following issues were expressed regarding the effects of the proposed project.

- Grassland habitat for Columbian sharp-tailed grouse and elk winter range on the Sophie Lake section may not be maintained over the long term.
- Thermal cover for white-tailed deer may not be retained on the Young Creek section.
- Improved road systems may cause a loss of habitat security for wildlife species on both sections of trust lands.
- Fencing along riparian areas may reduce big game movement or increase big game mortality.

ANALYSIS AREAS

This discussion occurs on 2 scales. The first scale includes DNRC-managed lands within Sections 16, T37N, R27W (Sophie Lake section) and Section 16, T37N, R28W (Young Creek section). Full descriptions for the project area and proposed harvest units are presented in *CHAPTER II-ALTERNATIVES*.

The second scale relates to the surrounding landscape for assessing cumulative effects. This scale varies according to the species being discussed, but, generally, approximates the size of the home range of the species in question. Under each grouping or species heading, the description for the cumulative effects analysis area will be discussed. In the cumulative effects analysis area, prior State actions and forseeable future actions were considered and discussed along with the current conditions on other ownerships. Species were dismissed from further analysis if habitat did not exist in the project area or would not be modified by any alternative.

ANALYSIS METHODS

To assess the existing condition of the project area and the surrounding landscape, a variety of techniques were used. Field visits, scientific literature, SLI data, aerial photography, Montana Natural Heritage Program data, and consultations with other professionals provided information for the following discussion and effects analysis. Specialized methodologies are discussed under the species in which they apply.

EXISTING CONDITION

COARSE-FILTER ASSESSMENT

DNRC recognizes that it is an impossible and unnecessary task to assess an existing environment or the effects of proposed actions on all wildlife species. We assume that if landscape patterns and processes similar to those that species adapted to are maintained, then the full complement of species will be maintained across the landscape (*DNRC 1996*). This "coarse filter" approach supports diverse wildlife populations by managing for a variety of forest structures and compositions that approximate historic conditions across a landscape. To compare present and historical conditions across the landscape, the analysis was conducted on the entire Stillwater State Forest using SLI data. Please refer to the *VEGETATION ANALYSIS* for the existing condition.

FINE-FILTER ASSESSMENT

On any particular piece of ground, individual species that are recognized to be of special concern are evaluated to conduct a "fine-filter analysis". In this fine-filter analysis, wildlife species

federally listed as "threatened" or "endangered", species listed as "sensitive" by DNRC, and species managed as "big game" by DFWP are included. These species are discussed in the following analysis.

Threatened and Endangered Species

Four species indigenous to northwestern Montana are classified as "threatened" or "endangered" under the Endangered Species Act of 1973. The bald eagle, Canada lynx, and grizzly bear are listed as threatened, while the gray wolf is listed as endangered.

➢ Bald Eagle

The bald eagle, classified as threatened, is protected under the Endangered Species Act. Strategies to protect the bald eagle are outlined in the *Pacific States Bald Eagle Recovery Plan (USFWS 1986)* and the *Montana Bald Eagle Management Plan (Montana Bald Eagle Working Group 1994)*. Management direction involves identifying and protecting nesting, feeding, perching, roosting, and wintering/migration areas (*USFWS 1986, Montana Bald Eagle Working Group 1994*) unless a site-specific plan is established.

A nest is being constructed on the southeast shore of Sophie Lake. The nest is suspected, though not confirmed at this point, to be a bald eagle nest. USFS personnel checked the nest last summer to find that no nesting by any species was occurring. The nest will continue to be monitored for use. If bald eagles are actively using the nest, nest (0.25-mile radius), primary use (0.5-mile radius), and home range (2.5-mile radius) areas would be defined and the management guidelines in the Habitat Management Guide for Bald Eagles in Northwestern Montana (*Montana Bald Eagle Working Group 1991*) would be followed. The planned treatments are consistent with managing favorable habitat conditions for bald eagles. No eagle nesting or potential habitat is expected on the Young Creek parcel.

➢ Canada Lynx

Canada lynx are listed as threatened under the Endangered Species Act. Lynx are associated with boreal and montane forests above 3,700 feet in Montana (*McKelvey 2000*). Lynx habitat in the Rocky Mountains consists primarily of coniferous forest with plentiful snowshoe hares, mature forest for denning and cover for kittens, and densely forested cover for travel and security. Lynx usually occur where topographic relief is low. Snowshoe hares use thick stands of regeneration and other stands that provide dense, low, canopy cover. The project area falls outside the elevational range of the lynx and contains dry habitat typically not used by lynx. A 13-acre stand along Young Creek on the western edge of the section is of a habitat type used by lynx; however, this area would not be affected under any alternative. Therefore, the lynx is not expected to be affected by this project and will not be analyzed further.

➢ Grizzly Bear

Grizzly bears are listed as threatened under the Endangered Species Act. The *Grizzly Bear Recovery Plan* defines 6 recovery areas (*USFWS 1993*). This project lies between the North Continental Divide Ecosystem and the Cabinet-Yaak recovery areas. The Sophie Lake parcel lies 3 miles west of the North

Continental Divide Ecosystem boundary, while the Young Creek parcel lies 5 miles east of the Cabinet-Yaak recovery area.

Although no observations have been documented on these parcels, habitat for grizzly bears exists on both parcels. These parcels probably provide spring habitat and food sources for bears. During the spring of the year, bears focus on scavenging winter-killed big game and young succulent plants. These parcels also provide winter range for a host of big game species, are low in elevation, and green up early in the spring season. On the Young Creek parcel, some summer habitat along the creek could exist. Based on the current vegetation communities, grizzly bear use of these parcels during other seasons of the year is possible, but not probable, .

➢ Gray Wolf

The Northern Rocky Mountain Gray Wolf is listed as endangered under the Endangered Species Act. The *Northern Rocky Mountain Wolf Recovery Plan* defines 3 recovery zones (*USFWS 1987*). The proposed project is inside of the Northwest Montana Recovery Zone, but no documented wolf packs use this area; therefore, the species will not be considered further in this document. As a safeguard, a clause would be included in the contract to consult with USFWS personnel if a wolf den were documented within a mile of the project area.

Sensitive Species

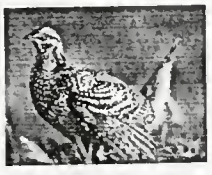
When conducting forest-management activities, the SFLMP directs DNRC to give special consideration to the several "sensitive" species. These species generally consist of small populations that are declining, have special habitat requirements, and could be affected by timber management. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful "fine filter" for ensuring that the primary goal of maintaining healthy and diverse forests is met.

A search of the Montana Natural Heritage Database documented 4 sightings of sensitive species in or within 1 mile of the Sophie Lake portion of the project area and 1 sighting within a mile of the Young Creek portion of project area. Most of these sightings (3 of 5) were of the common loon. The other sightings included an inactive Columbian sharp-tailed grouse lek (breeding/dancing ground) northeast of the Sophie Lake section and a pair of flammulated owls west of the Young Creek section. *TABLE III-1 - LISTED SENSITIVE SPECIES FOR THE NORTHWESTERN LAND OFFICE SHOWING THE STATUS OF THESE SPECIES IN RELATION TO THIS PROJECT* details how each sensitive species was handled in this analysis.

TABLE III-1 - LISTED SENSITIVE SPECIES FOR THE NORTHWEST LAND OFFICE (NWLO) SHOWING THE STATUS OF THESE SPECIES IN RELATION TO THIS PROJECT

SPECIES	DETERMINATION - BASIS
Black-backed woodpecker	Dismissed - No recently (less than 5 years) burned areas in the project area.
Boreal owl	Dismissed - The project areas do not provide boreal habitat; therefore, no boreal owl habitat would be affected.
Coeur d'Alene salamander	Dismissed - No moist talus or streamside talus habitat occurs in the project area.
Columbian sharp-tailed grouse	*Included* - Suitable grassland communities occur in the Sophie Lake section and an abandoned lek is documented in the vicinity.
Common loon	Dismissed - Suitable habitat occurs in and around the Sophie Lake section, but habitat associated with the lake would not be altered under any alternative.
Ferruginous hawk	Dismissed - Extensive grassland communities are lacking.
Fisher	*Included* - Potential fisher habitat occurs along Young Creek.
Flammulated owl	*Included* - Dry ponderosa pine habitats occur in both sections
Harlequin duck	*Included* - No occurrences along Young Creek have been documented, but riparian habitat would be modified by the channel restoration.
Mountain plover	Dismissed - Extensive grassland communities are lacking.
Northern bog lemming	Dismissed - No sphagnum or other fen/moss mats occur in the area.
Peregrine falcon	Dismissed - No cliff habitats occur within the project area.
Pileated woodpecker	*Included* - Ponderosa pine and western larch/Douglas-fir habitats occur in both sections.
Townsend's big-eared bat	Dismissed - No caves or mine tunnels occur in the project area.

➢ Columbian Sharp-Tailed Grouse

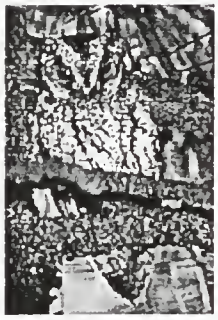


The Columbian sharp-tailed grouse is a grassland species. This species is herbivorous and relies primarily on leafy material, buds of shrubs, and fruits. Residual grass cover is important for nesting. Good quality grasslands and brushy areas provide cover for these grouse. Young sharp-tailed grouse rely on insects for survival and growth. Forest encroachment and livestock grazing pose threats to the habitat of this species by reducing food items and/or reducing herbaceous cover. On the Sophie Lake section, grasslands are intermixed with ponderosa pine forests. In some areas, ponderosa pine trees are encroaching on the grassland areas due to increased fire-return intervals. No livestock grazing is permitted on the west side of Sophie Lake; however, incidental cattle use has been observed. Habitat does not exist for this species on the Young Creek section.

To assess cumulative effects, the lands immediately adjacent to each section were considered. Adjacent to the Sophie Lake section, USFS and private landowners conducted

several prescribed burns aimed at maintaining grasslands, as well as thinning and regenerating (in openings) ponderosa pine. These grassland areas may provide some habitat for Columbian sharp-tailed grouse.

➢ Flammulated Owl



Flammulated owls prefer open, old stands of ponderosa pine and Douglas-fir. They usually nest in cavities of 12-to-25-inch dbh quaking aspen, ponderosa pine, or Douglas-fir excavated by pileated woodpeckers or northern flickers.

Both sections provide some habitat potential for this species. The Sophie Lake section contains mainly ponderosa pine habitats; however, many of these habitats consist of smaller diameter, more dense stands, though some scattered large trees occur on the section. On the Young Creek section, similar conditions occur in Douglas-fir habitats with scattered ponderosa pine and western larch. Presently, suitable nesting trees occur in both portions of the project area. However, with increased fire-return intervals and increased stand densities, habitat quality for flammulated owls is being reduced.

To assess cumulative effects, the lands immediately adjacent to each section were considered. Adjacent to the Sophie Lake section, USFS and private landowners conducted several prescribed burns aimed at thinning and regenerating (in openings) ponderosa pine. These areas may provide some habitat for flammulated owls. Adjacent to the Young Creek section, several harvests have occurred. To the northeast is a large meadow, which does not provide habitat for flammulated owls; however, the adjacent harvest units may. In other areas, the dense timber surrounding the section does not appear suitable for flammulated owl habitat.

➢ Fisher

Fishers are generalist predators and use a variety of habitat types, but are disproportionately found in stands with dense canopies. Fishers appear to be highly selective of resting and denning sites. In the Rocky Mountains, fishers appear to prefer late-successional coniferous forests for resting sites and tend to use areas within 150 feet of water more than expected based on their availability on the landscape. Such areas typically contain large live trees, snags, and logs, which are used for resting and denning sites, and dense canopy cover, which is important for snow intercept. Additionally, *Heinemeyer (1993)* found that reintroduced fishers in northwest Montana selected elevations between 1,970 and 3,280 feet and avoided elevations between 3,960 and 5,280 feet.

The Young Creek parcel offers potential fisher habitat, while the Sophie Lake parcel does not due to the open, dry conditions and lack of perennial streams. The Young Creek project area ranges between 2,740 and 3,320 feet in elevation, with a perennial stream running through the center of the section from west to east. The riparian bottoms along Young Creek contain western red cedar and grand fir, which may provide fisher resting habitat and movement corridors. The Sophie Lake section does not provide habitat for fishers. The Young

Creek section contains numerous open roads. Several of the roads lead to the creek and allow firewood cutters and trappers easy access.

For the cumulative effects analysis, the connectivity and habitat availability along the Young Creek riparian area above the project area would be considered. Presently, this riparian system connects the meadow community on the eastern edge of the State section to the forested sections of USFS, west of the section.

- Harlequin Duck

Harlequin ducks breed on turbulent streams where they feed primarily on aquatic insects, mollusks, and crustaceans. These birds spend the winter along the Pacific coast. Young Creek could provide adequate habitat; however, no observations of harlequin ducks have been documented on this stream. For cumulative effects analysis, connectivity and habitat availability along the Young Creek riparian area above the project area would be considered. Presently, this riparian system connects the meadow community on the east edge of the Young Creek section to the USFS forested sections of to the west.

- Pileated Woodpecker

Pileated woodpeckers excavate the largest cavities in trees of any woodpecker. The pileated woodpecker plays an important ecological role by excavating cavities that are used in subsequent years by many other species of birds and mammals. Preferred nest trees are western larch, ponderosa pine, cottonwood, and quaking aspen, usually 20 inches dbh and larger. Pileated woodpeckers primarily eat carpenter ants, which inhabit large downed logs, stumps, and snags. *Aney and McClelland (1985)* described nesting habitat for pileated woodpeckers as "stands of 50 to 100 contiguous acres, generally below 5,000 feet in elevation, with basal areas of 100 to 125 square feet per acre and a relatively closed canopy." The feeding and nesting habitat requirements, including large snags or decayed trees for nesting and large downed wood for feeding, closely tie these woodpeckers to mature forests with old-growth characteristics. The density of pileated woodpeckers is positively correlated with the amount of dead and/or dying wood in a stand (*McClelland 1979*). Both project areas provide scattered large ponderosa pine and Douglas-fir, and pockets of quaking aspen for nesting and feeding habitat for pileated woodpeckers. However, only about 109 acres along Young Creek and the edge along the hay field meet the criteria for nesting habitat. The remaining portions of the Young Creek and Sophie Lake parcels probably provide foraging habitat.

To assess cumulative effects, adjacent lands were considered. The project area is adjacent to other Douglas-fir and ponderosa pine covertypes in the mature-sawlog age class. These areas are dominated by Douglas-fir, with scattered ponderosa pine and western larch. Suitable habitat for pileated woodpeckers appears present in the surrounding landscape.

Big Game Species

Both portions of the project area provide winter habitat and lie within a documented winter range for elk, white-tailed deer, and mule

deer. Additionally, Young Creek provides winter habitat for moose. On the Sophie Lake section, the more-open habitats are more conducive to elk and mule deer winter range. One main road, gated and accessed through private lands, runs through the section. Access may occur through USFS lands to the north. Also, several home developments are in the area. Conversely, the Young Creek section occurs mainly on northern aspects and provides denser canopy closure, which is more conducive to white-tailed deer winter range. Many low-standard roads run through the section.

Special and Unique Habitats

No designated special or unique habitats were found in any harvest units. The project area includes several pockets of quaking aspen in harvest unit 2 on the Sophie Lake section. Quaking aspen is a declining habitat due to fire suppression and lack of timber-management activities. Quaking aspen communities provide additional biodiversity and habitat to the area.

ENVIRONMENTAL EFFECTS

COARSE-FILTER ANALYSIS

Direct and Indirect Effects – Coarse Filter

- ***Direct and Indirect Effects of No-Action Alternative A - Coarse Filter***

  Under this alternative, no additional direct effects would occur to wildlife species using the area. The stands proposed for treatment would not be harvested and would continue to convert to closed, dense stands, which would reduce understory vegetation. On the Sophie Lake parcel, the aspen stand would continue to decline and convert into a coniferous stand. Additionally, the grasslands would continue to be invaded by ponderosa pine. These conditions would decrease biodiversity on the Sophie Lake section. In general on both parcels, stands would be denser and contain more shade-tolerant tree species than expected historically. This alterative would favor species that use close-canopied forested habitats and negatively affect species that use the more open forest conditions, understory vegetation, and aspen and grassland communities for a portion of their life requirements.

- ***Direct and Indirect Effects of Action Alternative B - Coarse Filter***

  This alternative would reduce stocking densities, favor the retention of larger shade-intolerant tree species, increase understory vegetation growth and diversity, and rejuvenate quaking aspen and grassland communities on the Sophie Lake parcel. This alternative would move the vegetation communities toward historic conditions and would rejuvenate aspen and grassland communities, thereby increasing habitat diversity in the area. This alternative is expected to benefit native species by reproducing stand conditions to which native species are adapted.

Cumulative Effects – Coarse Filter

- ***Cumulative Effects of No-Action Alternative A to Coarse Filter***

  Cumulatively, the surrounding landowners used a combination of logging and prescribed fire to achieve more historical conditions. This alternative does not contribute to moving the area toward conditions that would be expected historically.

- ***Cumulative Effects of Action Alternative B - Coarse Filter***

  Cumulatively, the surrounding landowners used a combination of logging and prescribed fire to

achieve more historical conditions. This alternative would contribute to moving the area toward conditions that would be expected historically; however, some areas could be stocked at a lower density.

FINE FILTER ANALYSIS

➢ Bald Eagle

Direct and Indirect Effects

- ***Direct and Indirect Effects of No-Action Alternative A to Bald Eagles***

  Bald eagles or their habitat would not be affected by timber-harvesting activities under this alternative.

- ***Direct and Indirect Effects of Action Alternative B to Bald Eagles***

  Timber-harvesting activities are not expected to affect bald eagles if they nest in the current location. No harvesting activities are proposed on DNRC-managed lands south of Sophie Lake or along the north and west shorelines. The proposed harvest units fall in the home-range area of this suspected nesting territory. These harvests would focus on thinning timber stands to increase vigor of existing larger trees. The prescriptions would result in multistoried stands, with many of the existing large trees left on site and available for perch and nesting habitat. Vegetative screening and potential perch and nest trees would be retained along the lakeshore. Since timber harvesting would not affect the nesting or primary-use area and timber modifications would retain and/or facilitate development of beneficial habitat qualities, no short-term effects and possible minor positive effects in the long term to bald eagles would be expected under this alternative.

Cumulative Effects

- ***Cumulative Effects of No-Action Alternative A to Bald Eagles***

  Cumulatively, bald eagles or their habitat would not be affected by timber-harvesting activities under this alternative. Continued recreational use of Sophie Lake could affect eagle nesting. However, since this territory is possibly being colonized even with current recreational use; therefore, current recreational-use levels are not expected to affect bald eagle nesting. However, substantial increases in recreational-use levels could negatively affect eagles.

- ***Cumulative Effects of Action Alternative B to Bald Eagles***

  Cumulatively, no other DNRC activities are planned in the home-range area. Therefore, modification of eagle habitat is not expected over the effects discussed above. Continued recreational use of Sophie Lake could affect eagle nesting. However, since this territory is possibly being colonized even with current recreational use; therefore, current recreational-use levels are not expected to affect bald eagle nesting. However, substantial increases in recreational-use levels could negatively affect eagles.

➢ Grizzly Bear

Direct and Indirect Effects

- ***Direct and Indirect Effects of No-Action Alternative A on Grizzly Bears***

  Grizzly bears and/or their habitat would not be appreciably affected under this alternative. Under this alternative, motorized access, forage, and hiding cover would remain unchanged in the near future. No unrestricted access would

occur on the Sophie Lake section, while 6.5 miles of existing road on the Young Creek section would continue to receive unrestricted motorized use. Over time, herbaceous forage availability could decrease as timber cover increases. Since bears rarely, if ever, use these areas and these habitats changes are not expected to result in substantial changes to bear habitat, minimal negative effects would be expected.

- ***Direct and Indirect Effects of Action Alternative B on Grizzly Bears***

  Under this alternative, timber harvests and stream restoration would cause additional disturbance in the project area. The increased disturbance would further reduce the already low probability of a grizzly bear using the area during the project.

  Timber harvesting would alter grizzly bear habitat. The proposed project could increase herbaceous and, possibly, carrion availability, which could benefit grizzly bears by increasing food availability. Additionally, motorized access on the Sophie Lake section would remain minimal. On the Young Creek parcel, unrestricted motorized access would be reduced from 6.5 miles per square mile to zero. Since both parcels occur away from recovery areas, any benefits would be minimal. Therefore, minimal positive effects to grizzly bears are expected.

Cumulative Effects

- ***Cumulative Effects of No-Action Alternative A and Action Alternative B on Grizzly Bears***

  Cumulatively, neither alternative would affect grizzly bear habitat, although Action Alternative B would slightly increase the amount of available habitat and forage availability.

➢ Columbian Sharp-Tailed Grouse

Direct and Indirect Effects

- ***Direct and Indirect Effects of No-Action Alternative A on Columbian Sharp-Tailed Grouse***

  No displacement or mortality of sharp-tailed grouse is expected under this alternative. Sharp-tailed grouse habitat is expected to decrease as forests encroach into the grasslands.

- ***Direct and Indirect Effects of Action Alternative B on Columbian Sharp-Tailed Grouse***

  The existing grasslands would be partially reclaimed by harvesting and/or prescribed burning following harvests under this alternative. These treatments would remove a portion of encroaching trees and rejuvenate grasses; thereby, increasing the amount and quality of Columbian sharp-tailed grouse habitat. Since the project only affects a small area, only minimal positive effects are expected.

Cumulative Effects

- ***Cumulative Effects of No-Action Alternative A on Columbian Sharp-Tailed Grouse***

  Cumulatively, habitat for this species would decline in the area.

- ***Cumulative Effects of Action Alternative B on Columbian Sharp-Tailed Grouse***

  Cumulatively, habitat for this species would increase in the area.

➢ Flammulated Owl

Direct and Indirect Effects

- ***Direct and Indirect Effects of No-Action Alternative A on Flammulated Owls***

Under this alternative, flammulated owl habitat would be expected to decrease on both sections as tree densities increase and ponderosa pine trees die out of the stands.

- ***Direct and Indirect Effects of Action Alternative B on Flammulated Owls***

  Under this alternative, the proposed seedtree treatments would likely result in unsuitable habitat, but important structure (snags and seedtrees) would be retained for future habitat. The commercial thin/improvement harvests would likely enhance flammulated owl habitat by reducing tree density. Also, large trees and snags would be retained for short-term habitat and ponderosa pine would regenerate in pockets to provide habitat into the future. These treatments are expected to produce beneficial effects in the short and long terms.

Cumulative Effects

- ***Cumulative Effects of No-Action Alternative A to Flammulated Owls***

  Cumulatively, untreated areas around the project areas are expected to develop closed canopies and become denser. However, adjacent ownerships that have been treated have probably enhanced habitat conditions for flammulated owls. This alternative is not expected to increase habitat in the area.

- ***Cumulative Effects of Action Alternative B to Flammulated Owls***

  Cumulatively, these beneficial effects would combine with adjacent treatments to expand the amount of habitat in and around the project area.

➢ Fisher

Direct and Indirect Effects

- ***Direct and Indirect Effects of No-Action Alternative A to Fishers***

  Fishers or their habitat would not be affected on the Young Creek section under this alternative. Motorized access would continue to allow reduction of the fisher habitat components, primarily snags and coarse woody debris. Therefore, minimal negative effects to fisher habitat would continue.

- ***Direct and Indirect Effects of Action Alternative B to Fishers***

  No harvesting would occur within the riparian zone of the creek under this alternative; thereby, movement corridors and preferred fisher habitat would be retained. The stream restoration project could result in a short-term displacement of fishers and slight alteration of habitat component; however, these alterations are expected to be minor. On the upland, fisher habitat could be decreased; however, the timber types proposed for harvesting are drier than fishers tend to use;. Therefore, any reduction on the uplands are expected to result in negligible effects to fishers. Additionally, the proposed road closures would reduce access on the sections; thereby, reducing the loss of fisher habitat components. Overall, the timber harvesting and associated management in this alternative is expected to result in minor positive effects to fishers.

Cumulative Effects

- ***Cumulative Effects of No-Action Alternative A to Fishers***

  Cumulatively, no projects are ongoing or planned in the upper

stretches of Young Creek. Therefore, no changes in fisher habitat are expected under this alternative.

- ***Cumulative Effects of Action Alternative B to Fishers***

  Cumulatively, important fisher habitat and movement corridors in the area are not expected to change under this alternative.

➢ Harlequin Duck

Direct and Indirect Effects

- ***Direct and Indirect Effects of No-Action Alternative A to Harlequin Ducks***

  No riparian habitat would be affected with this alternative; therefore, no effects to harlequin ducks are expected.

- ***Direct and Indirect Effects of Action Alternative B to Harlequin Ducks***

  The proposed timber-harvesting would not disturb or alter riparian habitats along Young Creek; therefore, no effects to harlequin ducks are expected. However, the stream restoration project could affect harlequin ducks if they were using the area. This project could result in displacement of a nesting pair and failure of that pair to reproduce. The restoration of the stream channel could remove harlequin duck habitat until the stream stabilizes and riparian vegetation reestablishes, a period of 5 to 15 years . Since harlequin duck use is not likely and no use has ever been documented, the risk of affecting harlequin ducks is low.

Cumulative Effects

- ***Cumulative Effects of No-Action Alternative A and Action Alternative B on Harlequin Ducks***

  Cumulatively, no other projects are occurring or planned along Young Creek; therefore, cumulative risks are the same as the effects discussed above.

➢ Pileated Woodpecker

- ***Direct and Indirect Effects of No-Action Alternative A on Pileated Woodpeckers***

  Under this alternative, large trees and snags for feeding and nesting would remain on the landscape in the amount present. However, through time, few trees would attain the size required for pileated woodpeckers due to the high stocking densities on both the Sophie Lake and Young Creek sections.

- ***Direct and Indirect Effects of Action Alternative B on Pileated Woodpeckers***

  Under Action Alternative B, efforts would be made to retain large trees and existing snags, thereby minimizing snag loss. The thinning treatments on the Sophie Lake section are aimed at reducing competition and releasing the remaining trees. The remaining trees are expected to release and obtain large diameters in time. On the Young Creek section, the thinnings (62 acres would affect current potential nesting habitat) are designed to produce similar effects, while the seedtree treatments are aimed at increasing the amount of ponderosa pine and western larch on the section. On both sections, some large Douglas-fir would be removed, thereby reducing feeding opportunities for pileated woodpeckers. However, the reduction in the number of these large Douglas-firs would be small. In the long-term, the treatments would enhance pileated woodpecker habitat, while producing minimal short-term losses in feeding habitat and reduced nesting cover.

Cumulative Effects

- ***Cumulative Effects of No-Action Alternative A on Pileated Woodpeckers***

  Cumulatively, no other projects are planned immediately adjacent to either section; therefore, pileated woodpecker habitat in the surrounding area is expected to undergo the similar processes that are discussed above for the project area.

- ***Cumulative Effects of Action Alternative B on Pileated Woodpeckers***

  Cumulatively, no other projects are planned immediately adjacent to either section. Around the Sophie Lake section, USFS and private landowners conducted some harvests and prescribed burns to achieve similar silvicultural goals. In combination with this proposal, pileated woodpecker habitat is expected to increase as the remaining trees release to attain adequate size for feeding and nesting habitat. Past harvesting presumably removed pileated woodpecker habitat, resulting in reduced habitat in the area. However, these harvests regenerated primarily in shade-intolerant tree species and may add to pileated woodpecker habitat in the distant future.

BIG GAME

Direct and Indirect Effects

- ***Direct and Indirect Effects of No-Action Alternative A on Big Game***

  Under this alternative, big game habitat and security would remain unchanged on both sections. In time, forest encroachment into the grasslands on the Sophie Lake section would reduce forage. Additionally, the shrubs on the section would continue to age and become decadent and/or grow out of the reach of big game species over time. On the Young Creek section, forage production under the dense canopy would continue to be low. The amount of motorized use of these sections would remain constant or increase through time, thereby reducing habitat security. Motorized access results in larger effects on elk and mule deer, than for white-tailed deer.

- ***Direct and Indirect Effects of Action Alternative B on Big Game***

  Under Action Alternative B, big game habitat would be altered. On the Sophie Lake section, thermal cover would be reduced. However, the importance of thermal cover in the area is lessened due to the low snow accumulations. Forage would be increased due to the opening up of the forest canopy and possible prescribed fire. These changes are expected to benefit elk and, to a lesser extent, deer, except in years of heavy snow accumulation. The amount of motorized and human access would remain low (current level). On the Young Creek section, areas of thermal cover would be removed or reduced, thereby allowing forage increases in the area. Pockets of thermal and hiding cover would be retained throughout the area, especially along Young Creek. The seedtree cuts would provide forage for moose during the winter. On the Young Creek section, motorized disturbance and human access would decrease. With the proposed gating and low level of road reclamation, open-road density would drop from 6.5 miles per square mile to zero. Nonmotorized human access could occur along the 4.5 miles per square mile of gated roads. The decreased open-road density would benefit big game using this area by reduced disturbance and hunting pressure. Pockets and stringers of unharvested stands would provide hiding and/or thermal cover

throughout both portions of the project area.

Under this alternative, the restoration project area would be fenced to exclude cattle. The fence around the restoration area would be a 3-strand, 42-inch high barbed-wire fence, with the lowest wire 18 inches from the ground. This fence is expected to prohibit cattle use while allowing wildlife passage and limiting wildlife mortality. The fencing proposed under this alternative is not expected to prevent big game movement or substantially increase mortality, resulting in minimal negative effects to big game.

Cumulative Effects

- ***Cumulative Effects of No-Action Alternative A and Action Alternative B on Big Game***

  Under both alternatives, a fence would be built along the west boundary of the Young Creek section to prevent livestock trespass. The boundary fence would be 3-strands of barbed wire, 44-inches high, with the lowest wire 18 inches from the ground. The height of the fence is slightly higher than most recommendations for wildlife passage; however, the height is the minimum required to meet the definition of a legal fence (*MCA 81-4-101*). This fence is not expected to prevent big game use or substantially increase mortality, but is expected to reduce forage consumption by livestock.

- ***Cumulative Effects of No-Action Alternative A on Big Game***

  Cumulatively, under No-Action Alternative A, the project areas and adjacent lands would continue to increase in thermal cover, thereby continuing to reduce forage. Therefore, big game (especially elk, mule deer, and moose) habitat is expected to decrease due to reduced forage availability.

- ***Cumulative Effects of Action Alternative B on Big Game***

  Cumulatively, thermal and hiding covers would be reduced; however, forage production would increase. In most years, snow conditions are mild on the project areas, thereby limiting the importance of thermal cover. However, in high snow accumulation years, the benefits realized in increased forage may be suppressed by the increased importance of snow intercept (thermal cover). The surrounding landscape around Young Creek provides high amounts of thermal cover. Therefore, increased forage is expected to increase habitat quality in the area for these species. The decrease in canopy cover expected by these projects may reduce, to a limited degree, the quality of white-tailed deer habitat in the area, but, overall, is expected to benefit big game species.

SPECIAL HABITATS

- ***Effects of No-Action Alternative A on Special Habitats***

  Under No-Action Alternative A, the mature aspens are expected to die out and aspen suckers are expected to be outcompeted by the conifers, resulting in the loss of aspen in the project area.

- ***Effects of Action Alternative B on Special Habitats***

  Under this alternative, conifer trees within 50 feet of an aspen stand would be cut to provide an opening for aspen regeneration. A few scattered ponderosa pine would remain within the 50-foot buffer. The cut trees would be felled into the stand and processed to provide slash for a prescribed fire in the area. Fire would regenerate the aspen stand, while providing aspen snags for wildlife habitat. After treatment, the regenerated stand

would produce big game browse in the short-term, while regenerating the stand to retain the aspen habitat on the landscape. Maintaining aspen on the landscape provides habitat for many wildlife species, thereby promoting biodiversity.

VEGETATION ANALYSIS

INTRODUCTION

This analysis will consist primarily of describing covertype and age-class distributions of timber stands and noxious weed conditions on roads leading to and on State ownership.

This analysis will also address the following resource management issues and concerns:

- Timber harvesting could alter the composition and diversity of tree species.
- Portions of grassland and young timber stands that have been growing within the grassland boundaries could be affected by the prescribed burning.
- Logging slash could affect forest fuel loadings and add additional wildfire hazards.
- Logging, heavy equipment, and vehicle traffic could establish or spread noxious weeds on disturbed areas.
- Tree harvesting and overstory canopy removal are needed to improve the growth of grasses and forbs.

ANALYSIS AREA

The vegetation analysis includes 3 geographic scales:

- The areas proposed for timber harvesting and broadcast burning activities in the 2 sections will be analyzed.
- The analysis for the coarse filter will consider historic conditions from Climatic Section 333C, which represents the Upper Flathead Valley (*Losensky 1997*). Current and appropriate conditions were analyzed on the scale of the entire Stillwater State Forest and the State land parcels scattered across 20 sections in townships 33, 34, 35, 36, and 37 north. These scattered parcels of land, administered by Stillwater State Forest, are located northwest of the main forest.
- Noxious weeds will be analyzed at the project level.

Within the analysis area of the contiguous Stillwater State Forest and scattered parcels of land, other timber sale projects have been initiated, but not completed. The initial planning and development of these sales are taking place concurrently with the analysis of the project. The estimated effects of these projects on covertypes and age-class distributions will be considered in a cumulative-effects analysis for Stillwater State Forest.

ANALYSIS METHODS

BACKGROUND

An evaluation of the timber species and age classes present on the project area was done.

The SFLMP directs DNRC to take a coarse-filter approach to biodiversity by favoring an appropriate mix of stand structures and compositions on State land (*DNRC 1996*). To implement a coarse-filter approach and meet the SFLMP directives, landscape-analysis techniques were used to determine an appropriate mix of stand structures and compositions, including forest covertype representation, age-class distribution, and structural characteristics.

METHODS

This landscape analysis will view components, such as covertype representation, from varying spatial scales. The analysis will also compare historic conditions and desired future conditions that are believed to be appropriate for the site occupied by stands in the analysis area.

The stand-level inventory (SLI) data from the 1930s was used in the *Losensky 1993* data to estimate the

proportion of various stages of stand structure by covertype as they were historically represented throughout the Inland Northwest. This provides an estimate of the natural characteristics of forests prior to fire suppression and active management. *Losensky (1997)* has worked with DNRC to complete an analysis for the entire State; some vegetation types specific to that work are included in this analysis.

The Stillwater SLI was used to assign covertypes. This data is available at the Stillwater Unit office in Olney.

The SLI database is updated annually to include changes as harvesting activities take place. This update process provides DNRC foresters with the best available data for the required coarse-filter analysis on proposed management activities. Where current and future timber sales have not yet received a postharvest inventory, probable effects are taken into consideration to address cumulative impacts in each analysis area for Stillwater State Forest.

Noxious weeds were identified on the project area by DNRC foresters, USFS range personnel, and botanists doing a survey of sensitive plants in the summer of 1999. The analysis is based on knowledge of weeds and the expected results of the mitigations.

EXISTING CONDITION

CURRENT AND APPROPRIATE COVERTYPE AND AGE-CLASS DISTRIBUTION

- Sophie Lake Section

  The Sophie Lake section currently has 545 acres of the ponderosa pine covertype, 13 acres of the mixed-conifer covertype, 80 acres of water, and 3 acres of nonforest. The current covertypes on the Sophie Lake section are listed as the appropriate covertypes in the SLI.

  Approximately 21 percent (112 acres) of the forested Sophie Lake section is in the 0-to-39-year age class, approximately 70 percent (386 acres) is in the 100-to-150-year age class, and approximately 9 percent (50 acres) is in the 150-year-plus age class.

- Young Creek Section

  The Young Creek section currently has 577 acres of the western larch/Douglas-fir covertype, 13 acres of the mixed-conifer covertype, and 50 acres of nonforest. The current covertypes on the Young Creek section are listed as the appropriate covertypes in the SLI.

  Approximately 9 percent (50 acres) of the forested Young Creek section is in the 40-to-99-year age class, approximately 50 percent (296 acres) is in the 100-to-150-year age class, and

TABLE III-2 – CURRENT AND APPROPRIATE (HISTORIC) COVERTYPES AND AGE CLASSES FOR STILLWATER STATE FOREST AND SCATTERED SECTIONS NORTH (99,264 ACRES) BY PERCENT

Covertype:	SUBALPINE FIR	DOUGLAS-FIR	LODGEPOLE PINE	PONDEROSA PINE	MIXED CONIFER	WESTERN LARCH/ DOUGLAS-FIR	WESTERN WHITE PINE
Current	34	1	5	1	27	23	9
Appropriate	27	2	6	1	11	44	9
Age Class:	0-TO-39-YEAR AGE CLASS	40-TO-99-YEAR AGE CLASS		100-TO-150-YEAR AGE CLASS		150-YEAR-PLUS AGE CLASS	
Current	9	25		27		39	
Historic*	36	13		22		29	

This information is based on Stillwater State Forest's SLI database (SLI Poly 8020)
**Using Lozensky's data for historic Upper Flathead Valley*

approximately 41 percent (244 acres) is in the 150-year-plus age class.

➢ Contiguous Stillwater State Forest and Scattered Sections

The current and appropriate covertypes for Stillwater State Forest and the scattered sections north (97,768 acres) are shown in *TABLE III-2 – CURRENT AND APPROPRIATE (HISTORIC) COVERTYPES AND AGE CLASSES FOR STILLWATER STATE FOREST AND SCATTERED SECTIONS NORTH (97,768 ACRES) BY PERCENT*.

INFLUENCE FROM PAST ACTIVITY

➢ Sophie Lake Section

The Sophie Lake section was first entered in 1919, removing approximately 1.1 MMBF of sawtimber. A timber trespass removed 10 MBF in the 1940s. During the 1950s and 60s, Christmas tree permits thinned this section.

Ponderosa pine grows on the drier sites of this section, while Douglas-fir and a component of quaking aspen grow on the moister sites. Ponderosa pine is the largest component of the stand and is made up of large, old trees with an understory of suppressed, overstocked ponderosa pine. This is characteristic of a stand influenced by fire suppression and long intervals between management treatments. The trees encroach the grasslands on this section. Under natural conditions, fires would have killed some of the regeneration, leaving less trees per acre. Long fire-return intervals have influenced fuel loading (buildup of duff) on the Sophie Lake section. Each inch of duff (dead needles and branches) contributes approximately 10 tons per acre of fuel loading (*George Curtis, USFS, retired*). Under natural conditions, fire would have reduced the amount of duff on the ground, and the intensity of future fires would likely be less than under present conditions for nonprescribed fires. In 1998, USFS reintroduced fire into the ecosystem in the Sophie Lake area when they conducted prescribed burns. A small area in the northern part of this section was included in a prescribed burn. In this and other prescribed burns in similar timber types, mortality in the trees less than 1 inch dbh was approximately 50 percent; in the larger trees it was approximately 5 percent.

Land ownership adjacent to this section is a mixture of USFS and private. Both aerial photos and on-the-ground reconnaissance on the Sophie Lake section show that little timber harvesting has occurred on the adjacent land, with much of the land to the east and south being converted to homesites. USFS land to the west has had limited thinning in the past; USFS land to the north has been harvested in the past and is now ponderosa pine and open grassland.

➢ Young Creek Section

Past forest-management activities and, to a lesser extent, fire suppression have been major influences on the characteristics of forested landscapes in the Young Creek area. Commercial harvests have occurred on nearly 100 percent of the timbered portion of this section. A timber harvest in the early 1940s removed approximately 5.8 MMBF of sawtimber. During the 1950s and 60s, Christmas tree permits thinned this section. A harvest in the 1970s removed approximately 1.7 MMBF.

The Young Creek section is a mosaic of Douglas-fir, western larch, grand fir, lodgepole pine, Engelmann spruce, and subalpine

fir, with Douglas-fir being the largest component. Historically, Douglas-fir was also the largest component on this section. Old stumps and cutting records indicate that ponderosa pine is a smaller component than was historically present. After the past harvesting of ponderosa pine, other species of trees were more successful in regenerating. Three components of age classes are present on this section, with the variations in the percentage of each age component and percentage of species composition creating the mosaic. Older and larger trees (100 to 149 years old, 15 to 21 inches dbh) are interspersed throughout most of the section, with a strong component of merchantable smaller and younger trees present. A component of submerchantable trees with suppressed growth is also present throughout the section due to past fire and forest-management decisions.

Land ownership adjacent to this section is a mixture of USFS and private, with varied amounts of timber harvesting.

A review of aerial photos for the Young Creek section shows seedtree cuts on USFS lands to the west. Primarily individual-tree-selection harvests have been done on USFS lands to the south. Private ground to the east has been converted to homesites and pastures, while the private ground to the north is being converted to homesites.

NOXIOUS WEEDS

➢ Sophie Lake Section

Spotted knapweed (*Centaurea maculosa*), Canada thistle (*Cirisum arvense*), oxeye daisy (*Chrysanthemum leucanthemum*), and rush skeleton weed (*Chondrilla juncea*) plants grow primarily along the roads in this section.

➢ Young Creek Section

Spotted knapweed, Canada thistle, oxeye daisy, and orange hawkweed (Hieracium *aurantiacum*) are present on this section. Near a road and old sawmill site on the southwest quarter of the section, about 5 acres are infested with spotted knapweed. Oxeye daisy is found scattered throughout the section, mostly along roads. Orange hawkweed was found along a creek near the meadow located in the northeast quarter of the section.

ENVIRONMENTAL EFFECTS

DIRECT AND INDIRECT EFFECTS

- ***Direct and Indirect Effects of No-Action Alternative A on Vegetation***

➢ Sophie Lake Section

Vigor would continue to decrease in these timber stands; growth rates would remain slow and likely decrease. Loss of vigor would increase the risk of damage to the timber stands from insect infestations and disease infections.

Under No-Action Alternative A, no burning would be prescribed and the buildup of duff would continue. The grasslands would continue to decrease as trees become established within the grassland boundaries.

The project area would continue to be used for dispersed recreation. Weed seed would continue to be spread by recreationalists. No funding would be collected to manage for noxious weed management purposes.

➢ Young Creek Section

Vigor would continue to decrease in these timber stands; growth rates would remain slow and likely decrease. Loss of vigor

would increase the risk of damage to the timber stands from insect infestations and disease infections.

Under No-Action Alternative A, no gates would be installed and continued unlimited access would continue. This access would likely result in the spread of noxious weeds already present and the introduction of other noxious weeds.

No funding would be collected to manage noxious weeds.

- ***Direct and Indirect Effects of Action Alternative B on Vegetation***

  - Sophie Lake

    This alternative would reduce stocking density in the stands while leaving many of the largest and healthiest ponderosa pine and Douglas-fir (on the moister sites). The increased health and vigor would reduce the chance for insect infestations and disease infections in the future. This harvest would not change the age class or covertypes on the Sophie Lake section.

    A broadcast burn would be conducted in the spring to provide the coolest burn possible and reduce the chance of damage to merchantable trees. The reduced duff in the units would decrease the fuel loading and likely make future wildfires in the area less destructive. The prescribed burn would thin saplings. The effects of prescribed burns on saplings and bunchgrass can already be seen on a small portion of the Sophie Lake section included in a USFS prescribed burn conducted in 1998. On similar timber covertypes in this area, approximately 5 percent of the merchantable timber and 50 percent of the trees less than 1 inch dbh were killed with prescribed burns. If no funding were available to conduct the prescribed burns, the slash and tops would be piled in landings and burned. Some soil sterilization and bunchgrass mortality would occur in the location of the burn piles.

    The prescribed burn would have the indirect effect of increasing forage for big game and habitat for Columbian sharp-tailed grouse.

    The potential for noxious weed populations to increase with the action alternative does exist. Equipment and vehicles related to harvesting would be operated on the Sophie Lake section. Mineral soil within the proposed harvest units would be exposed during the blading of existing roads, construction of log landings and temporary roads, and skidding of logs.

    Noxious weed populations would be expected to decrease through the proposed mitigation measures (see *APPENDIX A - STIPULATIONS AND SPECIFICATIONS)*.

  - Young Creek Section

    The improvement-cut treatment would reduce the stocking level of the stands; thus, the retained trees would have less competition for sunlight, water, and soil nutrients, which would likely increase the health and vigor of the stands. The result would be an increase in growth and a reduction in danger to the stands from insect infestations and disease infections. This improvement cut would not change the age classes or covertypes.

    Seedtree harvesting would move approximately 56 acres of the 150-year-plus age-class into a 0-to-39-year age class. These seedtree cuts would create openings large enough to allow Douglas-fir and western larch to

establish. The planting of ponderosa pine seedlings in these openings would ensure that ponderosa pine would be a larger component in the future. The future stands would have a degree of resistance to disease infections and insect infestations by increasing species diversity and creating a younger age class. On the analysis area of the Stillwater State Forest administrative unit, the 150-year-plus age class would change approximately 0.1 percent.

The potential for noxious weed populations to increase with the action alternative does exist. Equipment and vehicles related to harvesting would be operated on the Young Creek section. Mineral soil within the proposed harvest units would be exposed while blading existing roads, constructing log landings and temporary roads, and skidding logs.

Noxious weed populations would be expected to decrease through the proposed mitigation measures (see *APPENDIX A - STIPULATIONS AND SPECIFICATIONS)*.

➢ Young Creek Channel Restoration

This project proposes to disturb approximately 1.5 acres of soil and vegetation along Young Creek during the period of construction. However, the proposed revegetation efforts, which include an application of native grass seed and the planting of trees and shrubs, would act to mitigate these disturbances. The aggressive and proactive revegetation plan would help prevent the possibility of noxious weeds from invading areas disturbed during the construction period. DFWP would monitor the project site for a minimum of 2 years and control measures would be initiated if monitoring indicates substantial quantities of noxious weeds are present within the restoration area.

In the long term, vegetation would be the primary mechanism for stabilizing the disturbed soils within the new and current streambanks. Refer to *APPENDIX B - YOUNG CREEK BANK STABILIZATION AND FISHERIES HABITAT IMPROVEMENT PROJECT* for more details on the revegetation plan of the riparian area.

CUMULATIVE EFFECTS

- ***Cumulative Effects of No-Action Alternative A on Vegetation***

  Given continued fire suppression, this alternative would not add to Stillwater State Forest's general trend of moving mixed-conifer stands to more appropriate covertypes.

- ***Cumulative Effects of No-Action Alternative A and Action Alternative B on Vegetation***

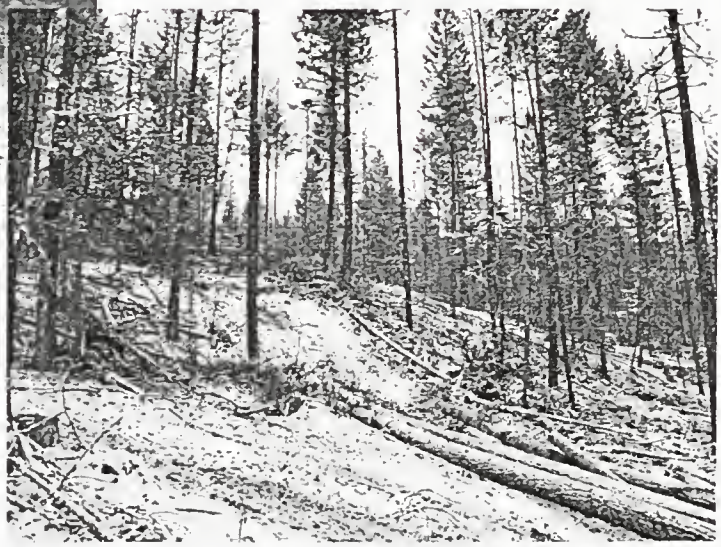
  In addition to the changes in age-class distribution from the proposed action, other timber sale projects have been initiated, but are not completed, or are completed, but not inventoried; thus, their effects are not represented in the SLI. These projects are estimated to increase the amount of area in the 0-to-39-year age class by approximately 1.7 percent and slightly decrease the area in 150-year–plus age class. The changes in covertypes in other timber sale projects would probably increase the amount of the western larch/Douglas-fir covertype by 3 percent over the analysis area, and, subsequently, reduce the area in the mixed-conifer and subalpine fir covertypes. The Stillwater State Forest's precommercial thinning program thins 200 to 500 acres of sapling stands each year. The thinnings often favor the retention of the western larch,

western white pine, and, in some cases, Douglas-fir covertypes. The cumulative effects is a trend toward seral covertypes in areas where recent forest-management activities have taken place.

Dispersed recreation, timber-management activities, and other uses create traffic on open roads on a regular basis for approximately 7 months of the year. This traffic, along with road maintenance and timber-harvesting activities, increases the areas exposed to weed establishment. The Stillwater Unit weed-management program has become more organized and, over time, cooperation with the two County weed departments has improved. As long as funding remains available, some large populations of weeds in the analysis area should be treated and greatly reduced. Ongoing annual weed management on road systems should reduce the current weed populations.

USFS weed-control measures for the Young J Fire Rehabilitation EA continues, as does weed control by the County, which is working independently with State and Federal agencies.

Existing environment near Sophie Lake



Example of an area where an improvement-cut treatment has been applied.

HYDROLOGY ANALYSIS

INTRODUCTION

The proposed Young-Sophie Timber Sale is located northwest of Eureka on the Sophie Lake (Section 16, T37N, R27W) and Young Creek (Section 16, T37N, R28W) sections. The water resources on the 2 sections differ:

- The Sophie Lake section does not contain any live streams, but a portion of this section is tributary to Sophie Lake, while the remaining portion is tributary to Swisher Lake and Koocanusa Reservoir.
- The Young Creek section is bisected by Young Creek, which flows in a west-to-east direction into Koocanusa Reservoir.

During internal and public scoping, the following issue was expressed:

The short- and long-term increase in sedimentation may result from timber harvesting, road-construction activities, the excavation of a new stream channel, and reclamation of the existing channel.

WATER USES AND REGULATORY FRAMEWORK

This portion of the Kootenai River basin, including the Young Creek watershed, is classified as B-1 by the State of Montana, as stated in the *Administrative Rules of Montana (ARM) 17.30.609*. The water-quality standards for protecting beneficial uses in B-1 classified watersheds are located in *ARM 17.30.623*. Water in B-1 classified waterways is suitable for drinking and culinary and food processing purposes after conventional treatment; bathing; swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life; waterfowl and furbearers; and agricultural and industrial water supplies.

State water-quality regulations prohibit any increase in sediment above naturally occurring concentrations in water classified B-1. "Naturally occurring", as defined in *ARM 17.30.602(17)*, means condition or materials present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil, and water conservation practices have been applied. Reasonable land, soil, and water conservation practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses. The State of Montana has adopted BMPs through its nonpoint-source management plan as the principle means of meeting the Water Quality Standards.

All rules and regulations pertaining to the SMZ Law (*ARM 36.11.301 through 310*) will be followed. An SMZ width of 100 feet is required on Class I and II streams when the slope is greater then 35 percent. An SMZ width of 50 feet is required when the slope is less than 35 percent.

WATER RIGHTS AND BENEFICIAL USES

Water rights for surface water exist on Young Creek for stock watering, irrigation, and fish raceways.

WATER RESOURCE MEASURE INDICATORS AND METHODOLOGY

The methods applied to the project area to evaluate the existing condition and potential direct, indirect, and cumulative effects include the *Rosgen* Stream Classification and the R-1 Channel Stability Rating (*Pfankuch, 1975*). These tools were deemed the most appropriate to provide information on stream channel form, function, and resistance to change. Water yield is used to assess the risk of in-stream erosion.

Water-yield thresholds were set after considering the condition of the channel, beneficial uses, and the potential for adverse impacts. Cumulative water-yield increase

percentage was calculated using the equivalent clearcut acres (ECA) method outlined in Forest Hydrology Part II (*Haupt et al, 1974*) and R1-WATSED.

EXISTING CONDITIONS

➢ Sophie Lake

The Sophie Lake section contains no live streams. Runoff generated by snowmelt infiltrates into the rocky soils or is transported as overland flow to Sophie or Swisher lakes. Due to the rolling topography, low precipitation, and landtypes on this parcel, it is unlikely that overland flow is common.

➢ Young Creek

Young Creek is a 17,900-acre perennial watershed that flows easterly into Koocanusa Reservoir. Ownership on the upper portions of the watershed, above the State parcel, is USFS. On the lower portions, below the State section, the ownership pattern is USFS mixed with nonindustrial private lands. Elevation within the Young Creek watershed ranges from 2,450 feet at the mouth to 7,400 feet at the uppermost point.

Rosgen channel typing was completed for most of Young Creek in 1998. Morphological characteristics of the reaches within and below the State section are indicative of Rosgen class B and C channels. A very short segment of the channel near the eastern boundary of the State section could be classified as a class D-type channel. The Rosgen class B channel is associated with low to moderate sediment-supply streams with a generally low potential for streambank erosion. Rosgen class C channel types are associated with streams with a higher sensitivity to disturbance, such as streambank erosion (*Rosgen, 1996*). The Rosgen class D channels are overwidened channels with gravel or cobble bars located in the middle of the channel, thus creating 2 or more smaller channels within the area normally occupied by a single channel.

The USFS Rexford Ranger District also conducted *Pfankuch* stability surveys on Young Creek in 1998. Stability is in the good-to-fair range for the lower reaches including State land, although some areas of instability are prominent. Some areas of channel adjustment are providing the stream with an abundant supply of sediment. Evidence of abandoned channels is present within the State-managed section. Some of the abandoned channels are due to channel response to natural events and influence from historic land-management activities. DFWP inventoried the stream channel using the USFS R1/R4 Fish Habitat Inventory System during 1998. Data from this inventory shows that approximately 97 percent of the riffles had stable banks on both sides of the streams. Stability was not measured on the pool habitats. Raw banks at outcurves viewed during the fall of 2002 and the subsequent depositions downstream support DFWP's plan for restoration to improve fish habitat.

During the 1950s, approximately 1,200 feet of Young Creek was moved near the toe of the hill slope, straightened, and levied. The channel constructed during the 1950s was likely wider than the natural channel. This overwidened channel provides poor aquatic habitat due to the limited number of pools. Although aggradation (bedload deposit buildup) is occurring below the ford on Young Creek, it is not an exclusive result of the channeling. This portion of Young Creek is a transitional reach, meaning that

it is between a higher gradient portion of the stream that transports sediment with a high degree of efficiency and a lower gradient portion of the stream that does not transport sediment efficiently. The result is a buildup of sediment that likely occurred naturally without the channeling, but the widening of the channel reduced the stream energy and may have exacerbated aggradation is some areas and, thus, created conditions similar to those of a Rosgen class D channel.

An irrigation ditch runs across State land to convey water from Young Creek. The headgate that controls the flow of water through the irrigation ditch is on USFS-managed land. This headgate is inoperable, rendering the ditch across State land unusable. The State cancelled the easement in the summer of 2000.

Other uses of the State section include livestock grazing and recreation. Limited impacts in the riparian area can be found from livestock use. These impacts are manure and hoofprints on the banks and in the stream.

EXISTING CUMULATIVE EFFECTS

Introduction

Cumulative watershed impacts are defined as the collective impacts on the watershed of the proposed action when considered in conjunction with other past and present actions that are related to the proposed action by location or generic type. Related future actions must also be considered when these actions are under current consideration (scoping by a State agency). Timber harvesting and associated activities affect the timing, distribution, and amount of water yield in a watershed. Water yield increases in proportion to the percentage of canopy removed because removal of live trees reduces the amount of water transpired, leaving more water available for soil saturation and runoff. Canopy removal also decreases interception of rain and snow and alters snowpack distribution and snowmelt, which leads to further increases in water yield. Higher water yields may lead to increases in peak flow and peak-flow duration, which could result in accelerated streambank erosion and deposition of fine sediment.

The boundary for cumulative watershed effects (hydrology and fisheries) for the Young Creek section is the Young Creek watershed (see *FIGURE III-1—YOUNG CREEK WATERSHED, next page*). Since no live streams exist on the Sophie Lake section, the cumulative watershed effects will be discussed qualitatively.

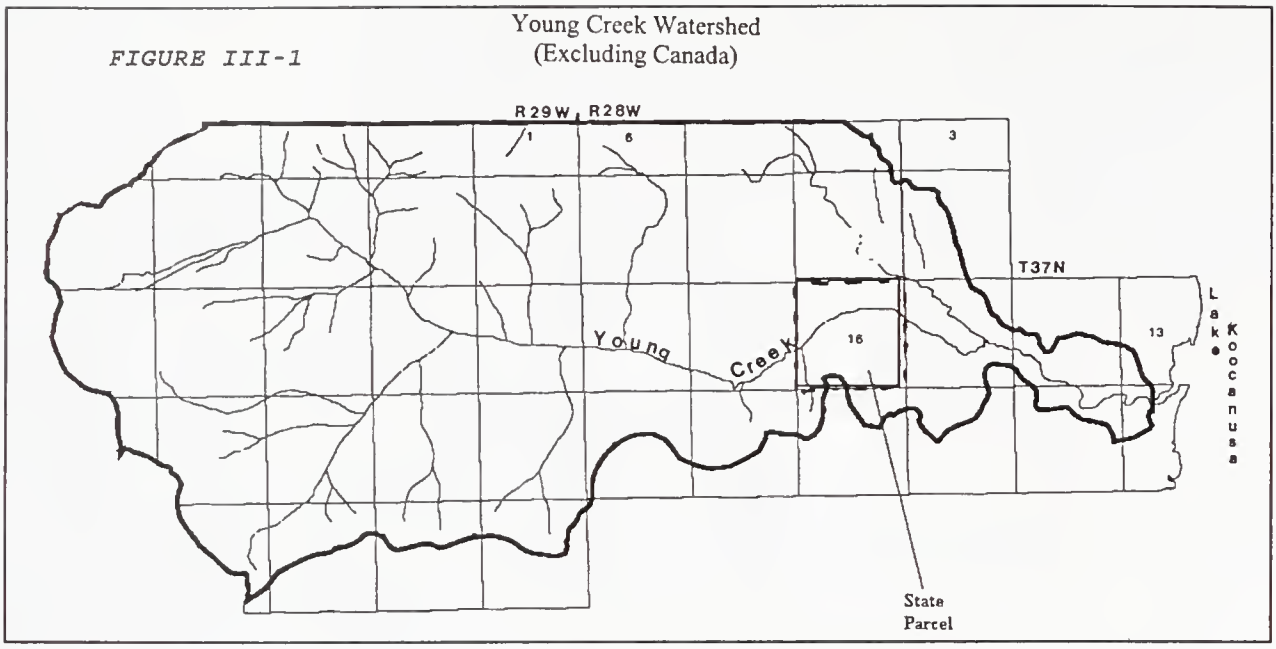
- Sophie Lake

  Since no scoured streams exist in the Sophie Lake section, using increases in annual water yield as a cumulative-effects tool is not practical. In order to assess the cumulative effects, a qualitative approach must be used. With the removal of trees, more water is available for transport to receiving bodies of water. As the amount of water available is increased, the potential for scour is also increased. Since there are no scoured streams in the Sophie Lake section, no negative cumulative effects have resulted from past management activities.

- Young Creek

  The peak-flow increase in Young Creek (as modeled by USFS Rexford Ranger District) from past and current land-management activities, including timber harvesting, wildfires, homesteading, and road building is 11 percent over predisturbance conditions, according to the *Young J Fire Rehabilitation*

FIGURE III-1



Environmental Assessment (2002). This peak-flow increase *includes* the canopy removal associated with this proposal. USFS set the recommended *peak flow* increase at 13 percent for this watershed. DNRC sets the recommended threshold based on *annual water yield*. The annual water-yield increase is generally less than peak-flow increases. The recommended threshold for this watershed is set at 12 percent annual water-yield increase. The threshold of concern is the percent of increase that may result in unacceptable in-stream erosion.

ENVIRONMENTAL EFFECTS

DIRECT AND INDIRECT EFFECTS

- ***Direct and Indirect Effects of No-Action Alternative A on Hydrology***

  No timber harvesting or road construction is associated with this alternative. Therefore, watershed conditions would continue to change as dictated by natural occurrences such as vegetative growth, wildfire, etc.

- ***Direct and Indirect Effects of Action Alternative B on Hydrology***

  ➢ Sophie Lake

  Approximately 42 ECA would be generated from 250 acres of commercial-thin harvest treatments in the Sophie Lake section. This additional ECA would not likely result in scoured stream channels or any measurable increase in overland flow. In addition to timber harvesting, about 1 mile of temporary road would be built and approximately 1.25 miles of existing road would have drainage improvements installed prior to hauling.

  ➢ Young Creek

  Timber harvesting in the Young Creek watershed would take place on approximately 506 acres. Harvest treatments on this area are mainly commercial thin/ improvement cut and 56 acres of seedtree harvesting. The treatments on these acres equates to 112 additional ECAs in the Young Creek watershed. The result of this alternative is less than a 1-percent increase in annual water yield. All harvest units would be

located at least 100 feet from Young Creek. No harvesting would take place within the SMZ.

In addition to timber harvesting, approximately one-half mile of road construction would be conducted on the north side of the Young Creek section. Approximately 600 feet of road would be constructed on the south side of the Young Creek section. All road construction would be well away from the stream, the nearest point being approximately 100 feet from Young Creek. Prior to hauling, drainage improvements would be installed on approximately 5.4 miles of the existing road to meet BMP standards prior to hauling.

Within this section, approximately 2.5 miles of nonessential road, including a ford on Young Creek, would be abandoned and the site rehabilitated. This would result in a net decrease in the miles of road in the Young Creek watershed.

Reducing the number of road miles found in the State parcel and improving drainage on the existing roads would reduce the risk of sediment introduction. Abandoning the ford and rehabilitating the site would eliminate a sediment source. In addition, the 100-foot SMZ would provide filtration for runoff. By improving roads to meet current BMP standards, maintaining a filtration zone adjacent to the stream, and following all applicable BMPs, adverse impacts to water quality would not likely result from the implementation of the timber harvest and associated activities proposed under this alternative.

YOUNG CREEK CHANNEL RESTORATION

Other proposed activities under this alternative include restoring Young Creek to a more natural channel design by constructing approximately 1,600 feet of new stream channel. The proposed new channel would be designed to have a proper cross-sectional dimension, meander pattern, and longitudinal profile to more efficiently transport sediment. By decreasing the bankfull width from approximately 40 feet to 19 feet, the stream power and the sediment transport efficiency would be increased. However, by increasing the channel length from 1,200 feet to 1,600 feet, the gradient would be reduced from approximately 1.6 percent to 1.2 percent. All other dimensions being constant, a reduction in gradient would result in decreased sediment-transport efficiency. After taking all individual dimensional changes into account, sediment transport efficiency would likely improve, although minimally.

In addition to affecting sediment-transport efficiency, the restoration of the stream channel would likely result in a seasonal short-term increase in turbidity for up to 3 years. The short-term increase would likely be realized during the initial period of flow through the new channel and the subsequent spring runoff until the stream channel is adjusted to the flows. Although the stream-channel adjustment would result in an increase in turbidity until the channel adjustments are complete, the turbidity would not likely result in long-term adverse impacts. A 318 Permit would likely be required from DEQ prior to any work. The potential for sediment delivery to the new stream channel would be reduced by a vegetation plan. Mitigation measures, including riparian fencing along a portion of Young Creek, seeding disturbed areas, minimizing fine sediment in material used for channel structure, and completing the work during the low-flow period, would

be implemented as part of this alternative. The results of the project and mitigation measures would likely reduce the area of streambank used by livestock and the potential for adverse impacts.

CUMULATIVE EFFECTS

- ***Cumulative Effects of No-Action Alternative A to Hydrology***

  - Sophie Lake

    The Sophie Lake section would not realize cumulative effects from this alternative.

  - Young Creek

    Under this alternative, no ground-disturbing activities are planned; therefore, no cumulative effects from this alternative would occur. The peak-flow increase for Young Creek would remain at the current level of 11 percent over predisturbance conditions until natural changes in vegetation occur.

- ***Cumulative Effects of Action Alternative B on Hydrology***

  - Sophie Lake

    Due to the topography, lack of scoured channels, and limited amount of ground-disturbing activities, negative cumulative impacts would not likely occur to water resources in the Sophie Lake section.

  - Young Creek

    Under this alternative, an additional 112 ECA would be realized in the Young Creek watershed. Even with this additional ECA, the peak-flow increase would remain at approximately 11 percent due to the low amount of crown removal. With the threshold of concern set at 12 percent, the additional ECA would not likely cause additional in-stream erosion.

    With the road abandonment, a net decrease in roads would be realized from this alternative, reducing the potential for sediment introduction into streams. All harvest units would be located at least 100 feet from Young Creek, with no harvesting in the SMZ. With these mitigation measures, negative cumulative effects would not likely result from this alternative.

    The sediment generated by the stream restoration would be short term, approximately 3 years. Mitigation measures would reduce the cumulative impacts from sediment introduction. Improvements expected from the channel restoration would result in a more efficient sediment transport. Also, riparian fencing would reduce the risk of impacts from livestock. Therefore, the potential cumulative effects from this channel restoration would be considered positive.

FISHERIES ANALYSIS

INTRODUCTION

Young Creek is one of the most important westslope cutthroat trout (*Oncorhynchus clarki lewisi*) spawning tributaries to Koocanusa Reservoir. Westslope cutthroat trout are highly sensitive to habitat alteration (*Rieman and Apperson 1989*). Pool-type habitat has been identified as critical habitat for cutthroat trout (*Schlosser 1991; Irving 1987; Pratt 1984*), and the quality and quantity of pool-type habitat has been shown to be significantly negatively correlated to land-management activities (*Dunnigan et al. 1998*). The proposed stream-restoration project is located on a portion of Young Creek that has been severely impacted by previous land-management activities, including channel manipulation, livestock grazing, timber management, and road construction. Land-management activities may influence a stream's hydraulic regime by altering the timing and magnitude of peak stream discharges (*Meehan 1991; Salo and Cundy 1987*). As a result, other water-quality parameters, channel morphology, channel migration, and width-to-depth ratios can be altered with changes in a stream's hydraulic regime (*Meehan 1991; Salo and Cundy 1987*), and may increase sediment delivery rates or modify a watercourse's capacity to transport or assimilate additional sediment (*Anderson 1998*). *Sweeten (1995)* identified excess sediment in rivers and streams as the largest and most pervasive water-pollution problem facing aquatic ecosystems in North America. The following discussion, therefore, addresses the potential for the proposed timber-harvesting activities and stream-restoration project to increase short- and long-term sedimentation within Young Creek and its lesser tributaries.

Increased amounts of suspended and bed-load sediment have the potential to affect fishes, fish populations, and fisheries habitat. Effects to individual fishes can include behavioral effects, which are generally thought to be benign and transitory in nature (*Newcombe 1994; Bisson and Bilby 1982; Berg and Northcote 1985*). Physiological effects can include impacts to growth (*Sigler et al. 1984; McLeavy et al. 1987*), blood chemistry (*Redding and Schreck 1980; Servizi and Martens 1987*), gill trauma (*Sherk et al. 1973; Simmons 1984; Servizi and Martens 1987*), and disease resistance (*Servizi and Martens 1987; Herbert and Merken 1961; McLeavy et al. 1987*). Elevated concentrations of suspended sediment also have the potential to impact fish populations. A literature review by *Anderson (1998)* suggests that the primary mechanisms for direct mortality to fish populations are increased egg mortality, reduced egg hatch, a reduction in the successful emergence of larvae, and sediment-induced deaths of juvenile and adult fish. Egg mortality is generally caused from burial and suffocation of eggs by settled sediment particles within the interstitial spaces of the substrate. Adult and juvenile salmonids are generally more resistant to direct mortality caused by suspended sediment than in earlier life history stages. Short-term increases in suspended sediment between 11,000 and 15,000 milligrams per liter appear to be the point at which juvenile and adult salmonid mortality significantly increases (*Stober, et al. 1981; Servizi and Martens 1987; Smith 1940*).

In addition to the direct impacts on fishes and fish populations, increased sediment loads can also impact fish habitat and the utilization of habitat by fish (*Scullion and Milner 1979; Lisle and Lewis 1992*). Relatively small increases in the amount of fine sediment have been shown to substantially reduce the porosity

and permeability of the streambed to the point that alevins and benthic communities are impacted (*Lisle and Lewis 1992*). *Weaver and Fraley (1993)* demonstrated that emergence success of westslope cutthroat trout was reduced from 76 to 4 percent when fine sediment was introduced to redds. Stream channel morphology can also be influenced by increases in sediment load. Increased sediment loads have been shown to change channel geometry (*Klein 1984*), reduce the pool depths and decrease fish-holding capacity (*Bjornn et al. 1977*), and decrease available cover (*Smith and Saunders 1958*). Sediment deposition can also impact salmonid rearing habitat because juvenile salmonids often use the interstitial spaces and streambed for hiding cover; therefore, when sediment deposits in pools and interstitial spaces, the available rearing habitat is reduced (*Bjornn et al. 1977*) and can reduce the carrying capacity of a stream (*Griffith and Smith 1993*). *Anderson (1998)* suggests that without the interstitial spaces available, juvenile salmonids may abandon the stream or move to less suitable habitats where survival may be reduced. Increased sedimentation can also affect fish populations by altering the available food supply. Elevated levels of sedimentation can decrease primary productivity. Periphyton communities may be the most susceptible to increased levels of sediment *(Singleton 1985)*. Decreases in primary productivity may also translate into a decreased food supply of macro-invertebrates that graze on periphyton (*Newcombe and MacDonald 1991*). Macro-invertebrates are an important food source for stream-dwelling salmonids. Increased sedimentation can also reduce the density, diversity, and structure of macro-invertebrate communities (*Gammon 1970; Lenat et al. 1981*). *Bjornn et al. (1977)* emphasized the importance of summer-rearing and winter-holding habitat, and suggested these habitats may be more important than embryo survival. Moreover, *Bjornn et al. (1977)* found a reduction in the overall carrying capacity when the interstitial spaces were filled with fine sediment. *Dunnigan (1997)* also suggests that the bedload deposition that fills pool habitats and reduces habitat complexity may be an important limiting factor during the winter months for westslope cutthroat trout. *Cunjak (1996)* also found that the preferred salmonid winter-habitat areas of low-current velocity are at higher risk to sedimentation than other habitat types of higher velocity.

ANALYSIS AREA

The Young Creek analysis area for the direct and indirect effects to aquatic resources lies approximately 11 miles northwest of the town of Eureka within the northeast quarter of State-owned Section 16, T37 N, R28W, in Lincoln County. Although the decision area where the timber-harvesting activities and stream-restoration project are planned lies exclusively on State-owned land within Section 16, the analysis area for the direct and indirect effects would include the Young Creek watershed from the west boundary of Section 16, downstream to Koocanusa Reservoir. The ownership downstream of the State-owned section is a mixture of USFS and nonindustrial private lands. The analysis area for the determination of cumulative effects is the entire Young Creek watershed. This will allow for the determination of cumulative effects based on all past, current, ongoing, and reasonably foreseeable actions within the Young Creek watershed.

ANALYSIS METHODS

The DFWP staff used several methods to assess the current condition of fisheries habitat and channel conditions within the project area. The Rosgen Stream Channel Classification System (*Rosgen 1996*)

was used to describe the characteristics of the existing stream channel within the proposed stream-restoration area. Channel - surveys have been conducted throughout the stream-restoration project area over a period of the previous 3 years. These surveys document that active channel shifting and bedload aggredation within the stream-restoration project area occurs during bankfull discharge events. Other geomorphical parameters calculated include thread (multiple versus single), entrenchment, sinuosity, width/depth ratios, and stream and valley gradient. In addition to these quantitative assessments to characterize the stream channel, a general qualitative assessment of channel stability and fisheries habitat was performed.

DFWP used a combination of several methods to determine what the future (restored) channel pattern and profile and fisheries habitat should resemble. These methods include the following:

- Reference Reach Analysis

  DFWP has conducted a geomorphic stream-channel assessment on Young Creek to document the "reference" or potential channel conditions for the restoration-project area. The analysis included the survey of channel pattern, profile, and typical cross-section dimensions for a stable reach of Young Creek located downstream of the proposed project and upstream of USFS Road 7176. Substrate composition, dimensionless ratio hydraulic geometry, and channel hydraulics were derived for the reference reach.

- USFS and DFWP Stream Gage Information

  Channel hydraulics and the predicted flood series were calculated using information provided by USFS (Rexford Ranger District) and DFWP. Indirect methods, including HEC-RAS and WinXSPRO modeling, and review of USGS equations (*Omang 1992*), were used to validate the predicted flood series and bankfull hydraulic conditions.

- KNF Hydraulic Geometry

  Hydraulic geometry relationships developed by KNF were used to develop cross-sectional design dimensions. The relationships were derived from the analysis of over 20 reference reaches located on KNF.

Professional judgment was the primary analysis method used to determine a qualitative risk assessment for sediment introduction and the impacts of sediment introduction on fishes and fish populations and their habitats that would likely result from the proposed timber-harvesting activities and the stream-restoration project. Several factors were considered during the assessment, including locations, project scales, project timing, recommended mitigation methods, and the implementation of BMPs.

EXISTING ENVIRONMENT

Young Creek is one of the most important westslope cutthroat trout spawning tributaries to Koocanusa Reservoir because it represents one of the last known genetically pure populations of westslope cutthroat trout in the region. This creek is also one of the most potentially productive tributary streams to Koocanusa Reservoir. The westslope cutthroat trout has been designated as a species of special concern in Montana because of a continual and substantial decline in natural populations. Although bull trout (*Salvelinus confluentus*) are not known to spawn in Young Creek, juvenile bull trout commonly enter Young Creek from the reservoir and rear for extended periods. The bull trout is listed as threatened

under the Endangered Species Act. Because juvenile bull trout occur occasionally, the project will be included in DFWP's Section 6 conservation plan with USFWS. Fisheries population estimates have been conducted 6 years prior to work within the project area. Young Creek also provides water for agriculture and other riparian-dependent resources.

A portion of Young Creek within the State-owned section has been severely impacted by past channel manipulations. During the 1950s, approximately 1,200 feet of this stream channel, located in the State-owned section, was straightened, constrained by a levy, and moved toward the hillside. This reach of Young Creek is classified as a D-4 channel type (*braided; Rosgen 1996*).

This channelization compromises the stream's ability to effectively transport sediment through the channelized area, causing the channel to aggrade (deposit bedload materials); this has exacerbated flood conditions. Ironically, the original channel modification aimed to alleviate these conditions. Consequently, the current aggradation has caused numerous problems with the stream, such as poor aquatic habitat, increased flood potential, lateral bank scour, and increased sediment supply.

This section of Young Creek is unable to adequately transport stream flow and bedload supply and still maintain a stable channel. The 1,200-foot, overwidened reach of Young Creek contains several mid-channel gravel bars and is currently not in equilibrium with regards to sediment supply and transport.

The current road system in the State's Young Creek section fords Young Creek. The site is used to drive through Young Creek with motorized vehicles and, due to the "ramp" approach, has been identified as a preferable site for watering cattle.

Additionally, livestock grazing and timber management in the upper reaches of Young Creek likely contributed to the instability of the channel in its present location.

ENVIRONMENTAL EFFECTS

DIRECT AND INDIRECT EFFECTS

- ***Direct and Indirect Effects of No-Action Alternative A on Fisheries***

  If the proposed stream-restoration project is not implemented, the reach of Young Creek within the proposed stream restoration project would provide a continual source of suspended and bedload sediment to lower Young Creek. The sediment would result from 3 sources:

  - The stream channel within the proposed stream-restoration site is currently composed of a multiple-channel thread with numerous areas of sediment deposition that are frequently mobilized during peak-flow events that promote lateral bank scour and downstream sediment delivery.
  - Cattle would continue to have access throughout the project site and continue to damage riparian vegetation and streambanks.
  - Motorized vehicles would continue to have access to the existing stream ford, resulting in a continual source of sediment to Young Creek.

  These sources of sediment would be long-term in nature and could continue to accelerate annually as the stream channel is exposed to spring runoff conditions. These conditions could exist for many years until the stream reaches a state of dynamic equilibrium with its capacity to assimilate and transport sediment.

The continual source of suspended and bedload sediment originating from within the proposed project site may likely impact fish populations and their habitats in lower Young Creek. If the proposed stream-restoration project were not implemented, the direct impacts to individual fishes would likely be minimal. This assessment is based on the fact that suspended sediment would be elevated during peak-flow events for relatively short durations and at concentrations below those demonstrated to be detrimental to an individual fish's physiology, growth, blood chemistry, disease resistance, gill health, or mortality. However, not implementing the stream-restoration project would likely have the most substantial impacts on fish populations and fisheries habitat in Young Creek. The chronic annual supply of sediment generated within the proposed stream restoration site would likely continue to degrade conditions in lower Young Creek. Sediment pulses generated during peak-flow events in lower Young Creek would likely continue to reduce substrate porosity and permeability (*Lisle and Lewis 1992*) and primary and secondary productivity (*Singleton 1985; Anderson 1998*), and alter channel morphology and geometry (*Klein 1984*). The resultant changes may result in an overall reduction in the depth and frequency of pool habitat (*Bjornn et al. 1977*), available cover (Smith and Saunders 1958), and the overall quality and quantity of summer and winter rearing habitat (*Bjornn et al. 1977*) that would likely result in an overall reduction of the stream's salmonid carrying capacity (*Griffith and Smith 1993*). Recreational opportunities associated with fish and wildlife resources would remain reduced in Young Creek and, to a lesser extent, in Koocanusa Reservoir, since cutthroat trout in Young Creek exhibit resident, fluvial, and adfluvial life history types.

Since the proposed timber-harvesting activities would not occur under this alternative, no additional impact on fish, fish populations, or fisheries habitat would occur.

- ***Direct and Indirect Effects of Action Alternative B on Fisheries***

  Under this alternative, timber-harvest treatments would include activities on approximately 506 acres. All harvesting would take place a minimum of 100 feet from Young Creek. No harvesting would occur in the SMZ. The only new road construction associated with this alternative would be the construction of approximately 0.6 miles of road. This road would not cross Young Creek and would be located a minimum of 100 feet away from the creek. Additional road-management activities would include the installation of water dips on several USFS roads; grass seeding disturbed areas, and reclaiming approximately 2.5 miles of road. These measures would help assure that sediment would not enter Young Creek. Implementation of all forestry BMPs would help assure that water quality and fisheries habitat would not be compromised as a result of timber-harvesting activities.

  The overall long-term impacts of this project are expected to have substantial beneficial impacts to the aquatic and terrestrial life in Young Creek. However, there may be short-term adverse impacts to aquatic life during the construction phase of this project. Short-term increases in turbidity will occur during project construction, especially when Young Creek is routed into the newly constructed stream

channel. To minimize turbidity, construction will occur during a low-flow period and operation of equipment in the stream channel will be minimized to the extent practicable. The channel would be constructed in the dry to minimize increases in suspended sediment during construction. Following completion of the new channel, the temporary diversion dams would be removed and streamflow would be reactivated in the newly reconstructed channel.

Potential adverse impacts to the aquatic life in Young Creek would be limited to the construction period and through the period of stabilization. These impacts are expected to be minor based on the mitigation efforts, short duration of project construction, and limited geographical extent of the project based on the relative size of the entire Young Creek watershed. Elevated levels of suspended sediment may alter fish behavior within and downstream of the project area. Individual fish responses may include increased frequency of the cough reflex, avoidance of suspended sediment plumes, and temporary reduction in feeding and territoriality (*Newcombe 1994; Bisson and Bilby 1982; Berg and Northcote 1985*). These impacts are generally considered reversible and short lasting (*Newcombe 1994*). Potential physiological responses to increased suspended sediment include impaired growth (*Sigler et al. 1984; McLeavy et al. 1987*), gill tissue damage (*Sherk et al. 1973; Simmons 1984; Servizi and Martens 1987*), and a reduction in general health or resistance to diseases (*Servizi and Martens 1987; Herbert and Merken 1961; McLeavy et al. 1987*). However, these physiological responses typically result from chronic exposure to elevated levels of suspended sediment; the impacts would probably be minimal due to mitigation measures and the relatively short duration of project construction relative to the time required for many of these responses to be manifested. Project timing reduces the possibility of construction activities and associated sediment damaging westslope cutthroat trout redds or incubating juveniles. Project construction scheduling has deliberately been determined to avoid periods when cutthroat trout would have eggs deposited in the gravel. Cutthroat trout in Young Creek typically spawn during May. Adult adfluvial cutthroat trout would be residing in the reservoir during the construction period; therefore, construction scheduling would also ensure minor impacts to migrating adult cutthroat trout. Performing construction in the dry throughout the majority of the project, prior to diverting water into the newly constructed stream channel, would also minimize the project's short-term impacts to local fish populations.

The restoration project would be expected to reduce bank erosion and improve channel stability by restoring a degraded portion of the channel to a proper dimension, pattern, and profile, and thereby reducing streambank erosion and increasing and improving overall channel stability. Soils along the stream channel margin would be disturbed during channel construction, but would be quickly stabilized following the proposed revegetation efforts. The ford crossing would be remodeled to restrict motorized vehicles from crossing through the creek, but still allow the cattle to water; this would reduce additional streambank erosion and sediment delivery downstream. The riparian fencing associated with the stream-restoration project would

exclude cattle and help stabilize and protect the newly constructed streambanks and riparian vegetation, thereby helping to minimize erosion and instream sediment.

Implementation of the stream-restoration project should result in long-term sediment reduction from the 3 sources currently contributing sediment to lower Young Creek: stream instability resulting from improper functioning condition, cattle grazing and associated impacts, and motorized vehicle impacts at the ford crossing. These reductions should translate into a substantial positive improvement for fish populations and fisheries habitat within Young Creek. The chronic supply of sediment generated within the proposed stream-restoration site during peak-flow events would be substantially reduced and likely result in an improvement of current conditions within and below the proposed stream-restoration project in lower Young Creek. A reduction in this annual sediment load may likely result in a more steady aquatic ecosystem. Substrate porosity and permeability (*Lisle and Lewis 1992*), primary and secondary productivity (*Singleton 1985; Anderson 1998*), and channel morphology and geometry (*Klein 1984*) would likely improve and stabilize over the long term. These long-term trends of sediment reduction should result in an overall increase in the depth and frequency of pool habitat (*Bjornn et al. 1977*), available cover (*Smith and Saunders 1958*), and an increase in the overall quality and quantity of summer and winter rearing habitat (*Bjornn et al. 1977*) that may likely result in an overall improvement of the stream's salmonid carrying capacity (*Griffith and Smith 1993*). The proposed efforts are expected to improve pool habitat in a localized area. As a result, the project is expected to improve rearing conditions for juvenile westslope cutthroat trout and migration conditions for adult fish. These habitat improvements are expected to be most beneficial to local populations of westslope cutthroat trout. Periphyton communities may also benefit from the expected overall reduction in sediment (*Singleton 1985*). As a result of increased periphyton and available habitat in the interstitial spaces through a reduction in sediment, the abundance, diversity, and structure of macro-invertebrate communities may also increase (*Gammon 1970; Lenat et al, 1981*).

The long-term recreational opportunities associated with fish and wildlife resources in Young Creek and, to a lesser extent, Koocanusa Reservoir, may improve with long-term improvements in the aquatic habitat of lower Young Creek. Habitat for riparian-dependent wildlife also would be improved by enhancing the vegetation within the riparian corridor.

Under this action alternative, approximately 42 ECAs would be generated on the Sophie Lake section from approximately 250 acres of improvement-cut harvest treatments and approximately 350 acres of broadcast burning. Since this level of timber harvesting is not likely to result in the creation of scoured stream channels, and no scoured stream channels already exist in the Sophie Lake section, no impacts to fisheries resources would occur as a result of the implementation of this action alternative.

CUMULATIVE EFFECTS

- ***Cumulative Effects of No-Action Alternative A on Fisheries***

  If the proposed stream-restoration project were not implemented, the reach of Young Creek within the proposed stream restoration project would provide a continual source of suspended and bedload sediment to lower Young Creek and conditions would remain similar to status quo. Additionally, under this alternative, cattle grazing and watering would still continue within the Young Creek drainage. Streambank damage would likely continue as a result of livestock damage to the streambanks and the removal of riparian vegetation. Any past effects to fisheries habitat on USFS land are expected to recover at a natural rate (*USFWS 2002*). No cumulative effects are anticipated from the Kootenai Ecosystem Restoration and Kootenai River Wildlife Habitat Enhancements projects. No changes in fish habitat are anticipated from the proposed harvesting activities associated with the Young J Timber Sale (*USFS 2002*). Therefore, under this alternative, no additional cumulative effects to the analysis area would be likely.

- ***Cumulative Effects of Action Alternative B to Fisheries***

  No cumulative effects are anticipated from the Kootenai Ecosystem Restoration and Kootenai River Wildlife Habitat Enhancements projects. No changes in fish habitat are anticipated from the proposed harvesting activities associated with the Young J Timber Sale (*USFS 2002*). Increases in water yield in Young Creek are expected to be minimal for the proposed timber harvesting activities described in this document. Therefore, increases of in-stream erosion within Young Creek as a result of the described timber-harvesting activities should also be minimal. BMPs and mitigation measures (see *APPENDIX A - STIPULATIONS AND SPECIFICATIONS*) should also reduce the potential for sediment to enter Young Creek. Given the very low increase in water yield and mitigation measures associated with this alternative, negative cumulative effects would not likely result.

  Under this alternative, DFWP would implement the stream-restoration project that would help improve the stream channel form and function above and below the restoration site. The result would be a reduction in annual-suspended and bed-load sediment. The net result should be an improvement in the cumulative fisheries habitat within the Young Creek watershed. Associated with the stream-restoration project is the installation of a perimeter fence around the restoration project to protect the stream channel and banks from livestock damage. A reduction in livestock damage to the riparian vegetation and streambank would also contribute to improved cumulative conditions within the watershed. DFWP and DNRC will consult with the grazing permittee to determine the optimal number and locations of these water gaps to allow livestock access to water. DFWP would pay for the installation of the riparian fence and maintenance would be a shared responsibility of DFWP, DNRC, and the grazing lessee.

  Cattle grazing and watering would still continue within the Young Creek watershed, and some streambank damage would be expected to occur. However, with the installation of a new fence along the western boundary of Section 16, between USFS and DNRC lands, the impacts of livestock damage, due primarily to trespass

livestock, would be substantially reduced. This would result in a reduction of damage to streambanks and riparian vegetation and an overall reduction in sedimentation to Young Creek.

SOILS ANALYSIS

INTRODUCTION

This analysis is designed to disclose the existing condition of the soil resources and display the anticipated effects that may result from No-Action Alternative A and Action Alternative B. Compaction and soil displacement can reduce the productivity of the soil and are the primary concerns of this project proposal.

ANALYSIS METHODS

Soil productivity will be analyzed by evaluating the current levels of soil disturbance in the project area. *APPENDIX C - SOILS TABLE AND MAPS* provides basic landtype descriptions of soils and management concerns related to the landtypes.

ANALYSIS AREA

The analysis area for evaluating soil productivity will include DNRC-managed land in the project area. *APPENDIX C - SOILS TABLE AND MAPS* provides maps of the landtypes within the analysis area.

EXISTING CONDITIONS

Past harvesting in the Young Creek section was conducted mainly by ground-based equipment. As with any ground-based operation, soil productivity is likely to be reduced due to compaction and/or displacement. Visual estimates of the section indicate that less than 10 percent of the section exhibits signs of impacts that have reduced soil productivity. Most existing skid trails are vegetated with sapling-sized trees.

On the Sophie Lake section, less than 5 percent of the section is trafficked by skid trails, mainly due to the open grassland habitat. Existing skid trails are vegetated with trees.

ENVIRONMENTAL EFFECTS

DIRECT AND INDIRECT EFFECTS

- ***Direct and Indirect Effects of No-Action Alternative A on Soils***

  No ground-disturbing activities or effects are associated with this alternative.

- ***Direct and Indirect Effects of Action Alternative B on Soils***

  DNRC expects to maintain long-term soil productivity by implementing mitigation measures to control the area and degree of detrimental soil impacts to less than 15 percent of the harvest area. The detrimental impacts are primarily in areas that would show moderate levels of compaction and/or displacement. Proposed for timber harvesting are approximately 250 acres in the Sophie Lake section and approximately 506 acres in the Young Creek section. Impacts to soil may occur on skid trails and landings.

  Ground-based harvesting in the summer generally has a higher risk of soil displacement and compaction due to the direct contact between the equipment and the soil. Under this action alternative, skid trails and landings would not exceed 20 percent of the harvest area; about three-quarters of the 20 percent might be expected to result in moderate impacts. In order to mitigate the higher potential of impacts during the summer season, skid-trail spacing and soil-moisture restrictions would be specified.

  Harvesting under winter conditions reduces the potential for compaction and/or displacement of the soil because equipment is less likely to be in direct contact with the soil. As a result, up to 20 percent of winter ground-based skid trails may exhibit moderate impacts. Less direct contact with

the soil would result in a low risk of displacement and compaction.

Mitigation is a standard method of reducing potential impacts. By restricting the season of use, utilizing a minimum skid-trail spacing, and following all applicable BMPs, the risk to soil productivity due to compaction and displacement would be reduced. After applying the mitigation measures described below, the risk to adverse impacts to soil would be low. A summary of the potential impacts to soils is listed in *TABLE III-3 - SUMMARY OF IMPACTS TO SOIL FROM COMPACTION/ DISPLACEMENT UNDER ACTION ALTERANTIVE B* below.

Other activities associated with this alternative include the abandonment and restoration of approximately 2.5 miles of nonessential road. Portions of these road miles may be used for skidding during harvesting activities. Road restoration may include ripping, recontouring, installing waterbars, and grass seeding. By removing the 2.5 miles of road from the transportation system, approximately 3 acres of ground would be returned to forest production. In addition to the restoration, approximately one-third mile of new road on the Young Creek section would be constructed, which would eliminate forest production on approximately 0.6 acres.

Mitigation Measures

In order to reduce the impacts to soil resources, the following mitigation measures are recommended:

- Limit operations to periods when soils are relatively dry (less than 20 percent moisture), frozen, or snow covered to minimize soil compaction, rutting, and disturbance to drainage features.
- To reduce soil displacement, limit tractor skidding to slopes less than 40 percent. Winchline skidding may be required on slopes greater than 40 percent.
- The logger and sale administrator would agree upon a skidding plan prior to beginning harvesting operations.
- A large portion of fine litter and 10 to 15 tons of large woody debris would be left in the woods for nutrient cycling.

TABLE III-3 - SUMMARY OF IMPACTS TO SOIL FROM COMPACTION/DISPLACEMENT UNDER ACTION ALTERNATIVE B

DESCRIPTION OF PARAMETER	SECTION	
	YOUNG CREEK	SOPHIE LAKE
Acres of ground-based harvesting	506	250
Acres of skid trails and landings[1]	101	50
Acres of moderate impacts *if* harvested during summer[2]	76	38
Acres of moderate impacts *if* harvested during winter[3]	20	10
Percent of harvest area with moderate impacts *if* harvested during summer	15	15
Percent of harvest area with moderate impacts *if* harvested during winter	4	4

[1]20 percent of harvest area
[2]75 percent of summer ground-based skid trails may exhibit moderate impacts
[3]20 percent of winter ground-based skid trails may exhibit moderate impacts

The amount of woody debris left in the woods may be reduced near private property to meet hazard-reduction requirements.

CUMULATIVE EFFECTS

- ***Cumulative Effects of No-Action Alternative A on Soils***

  Since no ground-disturbing activities are associated with this alternative, no additional cumulative impacts are expected to occur.

- ***Cumulative Effects of Action Alternative B on Soils***

  Cumulative impacts to soil that may result from the implementation of this action alternative would reduce soil productivity on up to 48 acres in the Sophie Lake section and 76 acres in the Young Creek section from skid trails and landings. In order to limit the amount of soil productivity loss, existing skid trails and landings would be used where available. Other mitigation measures to limit the cumulative impacts to soil resources are listed above in the *DIRECT AND INDIRECT EFFECTS* section.

  The portion of the section converted to stream would be removed from timber and/or grass production. The existing streambed would eventually produce trees and/or grass, although the production would be very limited due to the lack of topsoil. The riparian fencing would reduce the potential for adverse impacts from livestock use.

Some soil is displaced and compacted during harvesting operations.

ECONOMICS ANALYSIS

INTRODUCTION

This section discusses the costs and benefits of the proposal in relation to DNRC's mandate to administer these school trust lands to produce the largest measure of reasonable and legitimate return over the long run (MCA, 77-1-02).

Concerns and issues:

- The low harvest volume per acre, the value of the logs to be harvested, and the cost of road development may not provide for an economical timber sale.
- The proposed broadcast burning of slash may be more costly than other methods of slash disposal.
- There may be a potential for DNRC's Trust Land Division to incur some of the long-term costs of monitoring or maintenance associated with the Young Creek Stream Restoration portion of the project.
- What are the benefits of road restrictions?

ANALYSIS AREA

For the direct economic effects, the analysis primarily displays cost estimates for managing the Sophie Lake and Young Creek sections of trust land, which includes maintaining roads and acquiring access to these sections. Indirectly the analysis will cover broader, State-wide effects.

ANALYSIS METHOD

The methods used in this analysis will display the costs and benefits of the no-action and action alternatives. For both the State and NWLO, an annual revenue-to-cost analysis is conducted.

EXISTING CONDITIONS

The last timber sale on the Sophie Lake section was conducted in 1919. The last timber harvest on the Young Creek section was conducted in 1973 and produced approximately $33,300 in revenue. Both of these sections are also considered in DNRC's annual State-wide sustained-yield harvest goal of 42.164 MMBF.

Currently, the only direct income being generated for the school trust from this project area includes money from a grazing lease and an agricultural lease; both leases are located on the Young Creek section. Combined, these leases produce an average of $570.00 per year.

ENVIRONMENTAL EFFECTS

DIRECT AND INDIRECT EFFECTS

- ***Direct and Indirect Effects of No-Action Alternative A on Economics***

  As a result of not implementing a timber sale, no additional revenue would be generated for the school trust fund. Revenue from the grazing and agricultural leases would likely remain unchanged.

- ***Direct and Indirect Effects of Action Alternative B on Economics***

  This section describes the cash flow as it relates to the timber- and road-management activities displayed in *CHAPTER II - ALTERNATIVES*. Following this will be a general discussion of estimates related to the stream-restoration project.

  Timber Sale Activities

  The impacts on local communities are estimated by quantifying jobs and incomes associated with harvesting and processing the timber into final products. Regional response coefficients for northwestern Montana indicate that timber harvesting provides 10.58 direct jobs per MMBF (*Keegan et al, 1995*). The average salary for timber-manufacturing employees is $32,090. Based on the estimated volume to be harvested, this sale would provide an estimated 17 jobs, with an estimated total income of $543,220.

TABLE III-4 – ESTIMATED REVENUES AND COSTS FOR TIMBER SALE ACTIVITIES WITH ACTION ALTERNATIVE B reflects the estimated costs and expected returns related to the timber sale proposals on both sections of school trust lands. Following are various assumptions that attribute to the values in this table.

Assumptions and elements used in the analysis of timber- and road-management activities are:

- Costs, revenues, and estimate of return are estimates intended for relative comparisons; they are not intended to be used as absolute return values.
- The harvest volumes were based on estimates made by Stillwater Unit personnel. For this project, 1.6 MMBF are within the range of total volume proposed for harvesting and will be used for this analysis.
- Based on the University of Montana's Bureau of Business and Economic Research (*Keegan, 2002*), the value of delivered logs on the Sophie Lake section is estimated at $268.00 per MBF and the Young Creek value is estimated at $345 per MBF.
- The costs of road development and maintenance for the proposed project are approximately $35,600. This includes maintenance costs and collections for the USFS Temporary Road Use Permit as well as the new construction and reconstruction projects. The purchaser of the timber sale would be required to incur these costs.

Since this project area is a long distance from the Stillwater Unit facility, minimizing long-term road-maintenance needs and costs are a concern. With the installation of gates on the Young Creek section, road-maintenance costs would be reduced in the long term.

- Ground-based tractor logging and hauling costs for the proposed sale average $178.50 per MBF for the Sophie Lake section and $150 per MBF for the Young Creek section.
- The Statewide Forest Improvement (FI) fee is based on program-wide costs and the cost to maintain a staff, perform timber-stand-improvement work, maintain road investments, and acquire rights-of-way. The money for the FI program is collected from the purchaser of the timber sale. This enables DNRC to improve the long-term productivity of timber stands and maintain or acquire access

TABLE III-4 – ESTIMATED REVENUES AND COSTS FOR TIMBER SALE ACTIVITIES WITH ACTION ALTERNATIVE B

	SECTION		TOTALS
	SOPHIE LAKE	YOUNG CREEK	
Estimated board foot volume (MBF)	600	1,000	1,600
Estimated value	$161,000	$345,000	$506,000
Road development costs	$1,500	$34,100	$35,600
Logging and hauling costs	$107,100	$150,480	$257,580
Estimated value of stumpage including FI (value minus road development, logging, and hauling costs)	$52,400 or $87.33/MBF	$160,420 or $160.42/MBF	$212,820 or $133.00/MBF
FI fee collections	$31,344	$52,240	$83,584
Stumpage value deposited to school trust funds	$21,056	$108,180	$129,236

for future revenue-producing projects. The current FI fee for the NWLO is $52.24/MBF.

- The sale-specific FI costs are the current cost estimates for the amount and types of treatments (site preparation, hazard reduction, planting, etc.) planned for each alternative being considered. Funding to complete these projects would be collected by the FI fee, as described above.
- The sale-specific FI activities following timber harvesting include:

  ➢ Sophie Lake Section

  The preferred method of site preparation and hazard reduction on the Sophie Lake section is a springtime, broadcast burn covering approximately 350 acres. The estimated cost is $10,000, which would cover personnel, ignition, control, and monitoring. DNRC would apply for cost-share money from the Rocky Mountain Elk Foundation and DFWP. DNRC's share could be as low as 50 percent of the total cost estimate.

  The burning project is dependent upon numerous factors besides the acquisition of cost-share funding. Weather, timing, fuel loads, and personnel availability are among the other factors that must be considered in large burning operations.

  If the factors favorable for burning are not attainable, DNRC would use equipment such as dozers to complete site preparation and hazard reduction responsibilities. Primarily, logging slash would be trampled and piled; DNRC personnel would return to burn those slash piles. The overall cost estimate would be approximately $8,000 and no cost-share would be available from Rocky Mountain Elk Foundation.

  ➢ Young Creek Section

  DNRC would use equipment on the Young Creek section to complete site preparation and hazard reduction responsibilities. Primarily, dozers would trample and pile slash created from logging; DNRC personnel would return to burn those slash piles. The overall cost estimate would be approximately $18,000.

  DNRC would also plant ponderosa pine on approximately 50 acres, at an approximate cost of $5,355.

Stream-Restoration Project

DFWP's cost estimate for the stream-restoration project is $45,000. Securing the funding and budgeting for the project work, permits, and licenses for the restoration project would be the responsibility of DFWP.

DNRC would issue a Land Use License to DFWP that may waive rental fees in lieu of performance, maintenance, and monitoring. Under a DNRC and DFWP Memorandum of Understanding (MOU) (2002), fees for stream restoration projects may be waived if the land stays in production. In the long term, the lands involved with the restoration project would be productive riparian habitat and not require compensation. DNRC would reserve all rights to the land affected by this action and would be held harmless from all claims and lawsuits that may result from damages. DFWP would monitor the project site annually for

the term of the license. DFWP would also be responsible for site maintenance and repairs, which would be approved by DNRC. DNRC would cooperate in the maintenance of the project fencing.

Other Revenue

Revenue from the grazing and agricultural leases would likely remain unchanged.

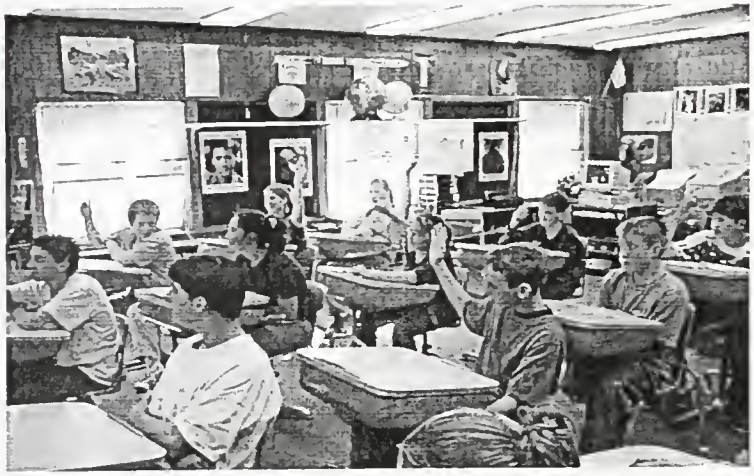
CUMULATIVE EFFECTS

This sale would be part of the annual harvest of timber from the State of Montana forest trust lands. The net revenue from this sale would add to the trust fund. Annual contributions to the trust fund have varied widely over the years because the actual contribution to the trust is more a function of harvest than of sales. Harvest levels can vary substantially over time, while sale volumes tend to be more consistent. *TABLE III-5 - ANNUAL REVENUE FROM TIMBER HARVESTED FROM STATE TRUST LANDS* shows the annual revenue from harvests for the last 5 years. The net contribution to the trust fund is also affected by the annual costs experienced by the DNRC for program management, which varies year to year. DNRC should continue to make net annual contributions to the trust from its forest-management program.

DNRC has a State-wide sustained-yield, annual-harvest goal of 42.164 MMBF. If timber from this project is not sold, this volume could come from sales elsewhere; however, the timber may be harvested from other areas and not benefit this region of the State. Long-term deferral of harvesting from this forest would impact harvesting patterns, changing both the region where the trees are harvested and the volumes taken. This would impact other areas of the State where these changes would occur.

TABLE III-5 - ANNUAL REVENUE FROM TIMBER HARVESTED FROM STATE TRUST LANDS

YEAR	HARVEST REVENUE
2001	8,524,150
2000	12,710,311
1999	6,998,847
1998	8,393,485
1997	7,327,641



Revenue generated from timber sales help support schools.

LIST OF PREPARERS

DECISIONMAKER

Robert Sandman, Unit Manager, Stillwater/Swan Units, DNRC, Stillwater State Forest, Olney, Montana

ID TEAM MEMBERS

Jay DeShazer, Fish and Wildlife Technician, DFWP, Libby, Montana 59923

Jim Dunnigan, Fisheries Biologist, DFWP, Libby, Montana 59923

Pete Evans, Co-project Leader, DNRC, Stillwater State Forest, Olney, Montana 59927

Michael McMahon, Co-project Leader, DNRC, Stillwater State Forest, Olney, Montana 59927

Norm Merz, Wildlife Biologist, DNRC, Northwestern Land Office, Kalispell, Montana 59901-2557

Marc Vessar, Hydrologist, DNRC, Northwestern Land Office, 2250 Highway 93 North, Kalispell, Montana 59901-2557

TECHNICAL SUPPORT AND ASSISTANCE

Margaret Beck, Graphics and Publication Technician, DNRC, Stillwater State Forest, Olney, Montana 59927

Don Copple, Fire Supervisor, DNRC, Stillwater State Forest, Olney, Montana 59927

Gary Hadlock, Forest Engineering Specialist, DRNC, Northwestern Land Office, Kalispell, Montana 59901-2557

Brian Manning, Forest Management Specialist, DNRC, Stillwater State Forest, Olney, Montana 59927

Paul McKenzie, Special Uses Forester, DNRC, Stillwater State Forest, Olney, Montana 59927

REFERENCES

Anderson, P.G. 1998. *Sediment Generation from Forestry Operations and Associated Effects on Aquatic Ecosystems.* Pages 491 through 508 *in* M.K. Brewin and D.M.A. Monita, Technical Coordinators Forest-Fish Conference: Land Management Practices Affecting Aquatic Ecosystems. Proceedings Forest-Fish Conference, May 1 through 4, 1996, Calgary Alberta. Natural resources Canada, Canadian Forest Service. North Forest Centre, Edmonton, Alberta. Information Report NOR-X-356.

Aney, W, R. McClelland. 1985. *Pileated Woodpecker Habitat Relationships (revised).* Pages 10 through 17 *in* Warren, N, eds. 1990. Old Growth Habitats and Associated Wildlife Species in the Northern Rocky Mountains. U.S. Forest Service, Northern Region, Wildlife Habitat Relationships Program R1-90-42. 47pp.

Berg, L. and Northcote, T.G. 1985. Changes in Territorial, Gill-Flaring, and Feeding Behaviour in Juvenile Coho Salmon (Oncorhynchus kisutch) Following Short-Term Pulses of Suspended Sediment. Canadian Journal of Fisheries and Aquatic Sciences 42:1410 through 1417.

Biological Assessment for Threatened and Endangered Fish Species, Young J Environmental Assessment, Young Creek Permanent Road Access Request (FRTA), USFS, KNF, Rexford Ranger District, August 2002

Biological Assessment for Threatened, Endangered, and Proposed Terrestrial Species, DNRC Road Access Special Use Permit, USFS, KNF, Rexford Ranger District, July 2002.

Biological Evaluation For Sensitive Terrestrial Species, DNRC Access Special Uses Permit, USFS, KNF, Rexford Ranger District, July 2002.

Bisson, P.A., and Bilby, R.E. 1982. Avoidance of Suspended Sediment by Juvenile Coho Salmon. North American Journal of Fisheries Management 4:371 through 374.

Bjornn, T.C., Brusven, M.A., Molnau, M.P., Milligan, J.H., Klamt, R.A., Chacho, E., and Schaye, C. 1977. Transport of Granitic Sediment in Streams and Its Effects on Insects and Fish. Office of Water Research and Technology, U.S. Department of Interior, Washington, D.C. 20240. Research Technical Completion Report, Project B-036-IDA. 43 pages.

Checklist EA, Eureka North Block E Prescribed Burn, March 1998, Stillwater State Forest.

Cunjak, R.A. 1996. Winter Habitat of Selected Stream Fishes and Potential Impacts from Land-Use Activity. Canadian Journal of Fisheries and Aquatic Sciences 53 (Supplement 1).

DNRC. 1996. State Forest Land Management Plan. Montana Department of Natural Resources and Conservation, Missoula, Montana.

Dunnigan, J.L. 1997. The Spatial Distribution of Cutthroat Trout in the Coeur D'Alene River System, Idaho. M.S. Thesis. University of Idaho, Moscow, Idaho.

Dunnigan, J.L., Bennett, D.H., and Rieman, B.E. 1998. *Effects of Forest Management on Westslope Cutthroat Trout Distribution and Abundance in the Coeur D' Alene River System, Idaho, USA.* Pages 471 through 476 *in* M.K. Brewin and D.M. A. Monita, technical coordinators Forest-Fish Conference: Land Management Practices Affecting Aquatic Ecosystems. Procedings Forest-Fish Conference, May 1 through 4, 1996, Calgary Alberta. Natural resources Canada, Canadian Forest Service. North Forest Centre, Edmonton, Alberta. Information report NOR-X-356.

Gammon, J.R. 1970. The Effect of Inorganic Sediment on Stream Biota. U.S. Environmental Protection

Agency. Water Quality Office, Pollution Control Research Service. 141 pages.

Griffith, J.S. and Smith, R.W. 1993. Use of Winter Concealment Cover by Juvenile Cutthroat Trout and Brown Trout in the South Fork of the Snake River, Idaho. North American Journal of Fisheries Management 13:823 through 830.

Heinemeyer, K.S. 1993. Temporal Dynamics in the Movements, Habitat Use, Activity, and Spacing of Reintroduced Fishers in Northwest Montana. M.S. Thesis, Univiversity of Montana, Missoula, Montana. 158pp.

Herbert, D.W.M., and Merkens, J.C. 1961. The Effect of Suspended Mineral Solids on the Survival of Trout. International Journal of Air and Water Pollution 5(1):46 through 55.

Irving, D.B. 1987. Cutthroat Trout Abundance, Potential Yield, and Interaction with Brook Trout in Priest Lake Tributaries. M.S. Thesis, University of Idaho, Moscow, Idaho.

Keegan, Chuck III, and Daniel P Wichman, A. Lorin Hearst, Paul E. Polzin, and Dwane D. Van Hooser. 1995. Montana's Forest Products Industry. A Descriptive Analysis 1969-1994. Bureau of Business and Economic Research, School of Business Administration, University of Montana. Missoula, Montana.

Keegan, Chuck. 2002. State Lumber Production, Employment Grows Slightly. Business and Economic Research, Director of Forest Industry Research.

Klein, R.D. 1984. Effects of Sediment Pollution upon the Aquatic Environment. Dated 30 November 1984. MD. Unpublished Manuscript.

Lenat, D.R., Penrose, D.L. and Eagleson, K.W. 1981. Variable Effects of Sediment Addition on Stream Benthos. Hydrobiologia 79:187 through 194.

Lisle, T.E., and Lewis, J. 1992. Effects of Sediment Transport on Survival of Salmonid Embryos in a Natural Stream: A Simulation Approach. Canadian Journal of Fisheries and Aquatic Sciences 49:2337 through 2344.

Losensky, BJ. 1997. Historical Vegetation of Montana. Unpublished report. Montana Department of Natural Resources and Conservation. Missoula, Montana.

McClelland, R. 1979. The Pileated Woodpecker in Forests of the Northern Rocky Mountains. Ph. D dissertation, University of Montana, Missoula, Montana.

McKelvey, K. 2000. *History and Distribution of Lynx in the Contiguous United States.* Pages 207-264 *in* Reggiero, LF, KB, Aubry, SW Buskirk, et al. 2000. Ecology and Conservation of Lynx in the United States. University Press of Colorado. Boulder, Colorado. 480pp.

McLeay, D.J., Birtwell, I.K., Hartman, G.F., and Ennis, G.L. 1987. Responses of Arctic Grayling (*Thymallus Arcticus*) to Acute and Prolonged Exposure to Yukon Placer Mining Sediment. Canadian Journal of Fisheries and Aquatic Sciences 44:658 through 673.

Meehan, W.R., editor. 1991. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Journal of Fisheries Society, Special Publication 19, 751 pages.

Miller, M. and J. Findley. 1994. Fire Effects Guide, Chapter IV - Plants. National Wildfire Coordinating Group. PMS 481.

Montana Bald Eagle Working Group. 1994. Montana Bald Eagle Plan. USDI. BLM, Billings, Montana. 61pp.

Montana Department of Natural Resources and Conservation. 2001.

Annual Report, Fiscal Year 2001.

Newcombe, C.P. 1994. Suspended Sediments in Aquatic Ecosystems: Ill Effects as a Function of Concentration and Duration of Exposure. British Columbia Ministry of the Environment, Lands and Parks. Habitat Protection Branch. Victoria, British Columbia. 51pp.

Newcombe, C.P., and MacDonald, D.D. 1991. Effects of Suspended Sediments on Aquatic Ecosystems. North American Journal of Fisheries Management 11:72 through 82.

Omang, R.J. 1992. Analysis of the Magnitude and Frequency of Floods and the Peak Flow Gaging Network in Montana. U.S. Geological Survey Water Resources Investigations Report 92-4048. Helena, Montana

Pratt, K.L. 1984. Habitat Use and Species Interaction of Juvenile Cutthroat Trout (*Salmo Clarki Lewisi*) and Bull Trout (*Salvelinus Confluentus*) in the Upper Flathead River Basin. M.S. Thesis, University of Idaho, Moscow, Idaho.

Redding, J.M., and Schreck, C.B. 1980. Chronic Turbidity and Stress in Juvenile Coho Salmon and Steelhead Trout. U.S. Department of Agriculture, U.S. Forest Service. Pacific Northwest Forest and Range Experimental Station, Corvallis, Oregon. Report PNW-1705-16.

Rieman, B.E., and Apperson, K.A. 1989. Status and Analysis of Salmonid Fisheries, Westslope Cutthroat Synopsis and Analysis of Fishery Information. Project R-73-R-11, Idaho Department of Fish and Game. Boise, Idaho.

Rosgen, D.L. 1996. Applied Fluvial Geomorphology. Printed Media Companies. Minneapolis, Minnesota.

Salo, E.O., and Cundy, T.W., editors. 1987. Streamside Management: Forestry and Fishery Interactions. University of Washington, Institute of Forest Resources Contribution 57, Seattle, Washington.

Schlosser, I.J. 1991. Stream Fish Ecology: A Landscape Perspective. Bioscience 41(10):704 through 712.

Scullion, J., and Milner, N. 1979. Review of Effects of Natural and Artificial Flow Patterns and Sediment Dynamics on Benthic Invertebrates and Salmonids in Upland Rivers. The University of Wales. Institute of Science and Technology. Cardiff. Department of Applied Biology.

Servizi, J.A., and Martens, D.W. 1991. Effect of Temperature, Season, and Fish Size on Acute Lethality of Suspended Sediments to Coho Salmon (*Oncorhynchus kisutch*). Canadian Journal of Fisheries and Aquatic Sciences 48:493 through 497.

Sherk, J.A., O'Connor, J.M., and Neumann, D.A. 1973. Effects of Suspended Sediments on Estuarine Environments. Estuarine Research 2:541-58. In: L.E. Cronin (editor) Estuarine Research. Academic Press, New York.

Sigler, J.W., Bjornn, T.C., and Everest, F.H. 1984. Effects of Chronic Turbidity on Density and Growth of Steelheads and Coho Salmon. Transactions of the American Fisheries Society 113:142 through 150.

Simmons, R.C. 1984. Effects of Placer Mining Sedimentation on Arctic Grayling of Interior Alaska. University of Alaska, Fairbanks: pages 1 through 75.

Singleton, H.J. 1985. Water Quality Criteria for Particulate Matter. British Columbia Ministry Of Environment. Resource Quality Section, Water Management Branch. Victoria, British Columbia.

Smith, M.W., and Saunders, J.W. 1958. Movements of Brook Trout (*Salvelinus Fontinalis*) Between and Within Fresh and Saltwater. Journal of the Fisheries Research Board of Canada 15:1403 through 1449.

Smith, O.R. 1940. Placer Mining Silt and Its Relation to Salmon and Trout on the Pacific Coast. Transactions of the American Fisheries Society 69:225 through 230.

Stober, Q.J., Ross, B.D, Melby, C. L., Dinnel, P.A., Jagielo, T.H., and Salo, E.O. 1981. Effects of Suspended Volcanic Sediment on Coho and Chinook Salmon in the Toule and Cowlitz Rivers. Technical Completion Report. FRI-UW-8124, Fisheries Research Institute, University of Washington, Seattle. 147 pages.

Sweeten, J. 1995. Sediment Working Group Formed to Tackle Top Water Pollutant. Fisheries.

USFWS. 1987. Northern Rocky Mountain Wolf Recovery Plan. USFWS, Denver, Colorado. 119pp.

USFWS. 1986. Recovery Plan for the Pacific Bald Eagle. USFWS. Portland, Oregon. 160pp.

USFWS. 1993. Grizzly Bear Recovery Plan. Missoula, Montana. 181pp.

USFWS. 1999. Rocky Mountain Wolf Recovery: 1999 Annual Report. USFWS. Helena, Montana. 22pp.

USFS. 2002. Young J Fire Rehabilitation Environmental Assessment. Kootenai National Forest, Rexford Ranger District, Eureka, Montana.

Weaver, T.M., and Fraley, J.J. 1993. A Method to Measure Emergence Success of Westslope Cutthroat Trout Fry from Varying Substrate Compositions in a Natural Stream Channel. North American Journal of Fisheries Management 13:817 through 822.

APPENDIX A
STIPULATIONS AND SPECIFICATIONS

The following mitigation measures include stipulations and specifications that will be incorporated into the Young Creek and Sophie Lake timber sales, the contract work for the stream restoration, and in the Land Use License for the stream-restoration project. These measures were identified as a means to prevent or reduce the risk of potential resource impacts during implementation of the projects. In part, stipulations and specifications are a direct result of issue identification and resource concerns.

Mitigation measures that apply to timber sale operations during the contract period would be contained within the Timber Sale Contract(s); as such, they are binding and enforceable. Mitigation measures relating to activities, such as hazard reduction, site preparation, and planting that may occur during or after the contract period, would be enforced by specific project administrators. Mitigation measures related to the stream-restoration project would be enforced through administration of the project and/or as specified in the Land Use License.

The following stipulations and specifications are incorporated to mitigate effects on the resources involved with the action alternative considered in this proposal.

SOILS AND WATER QUALITY

➤ ***ROADS***

- BMPs are incorporated into the project design and operations of the proposed project.
- The BMP audit process will continue. This sale will likely be reviewed in an internal audit and may be picked at random as a Statewide audit s
- Brush will be removed from existing road prisms to allow effective road maintenance.
- Existing roads are fully utilized for this proposal.
- Exposed soils will be seeded and fertilized concurrently with roadwork. Following the final blading, the road surfaces behind road closures will be grass seeded.
- Roads used by the purchaser will be reshaped and the ditches redefined following use. This will reduce surface erosion.
- Drain dips and gravel will be installed on roads as needed to improve road drainage and reduce maintenance needs and erosion.
- Some sections of roads will be repaired and upgraded to design standards that reduce erosion potential and maintenance needs.

➤ ***HARVEST OPERATIONS AND LAYOUT***

- Riparian indicators were considered in the harvest unit layout.
- DNRC will use the best methods available for logging and road building under this proposal.
- Logging equipment will not operate off forest roads unless soil moisture is less than 20 percent, frozen to a depth that will support machine operations, or snow covered to a depth that will prevent compaction, rutting, or displacement.
- Existing skid trails and landings will be used where their design is consistent with prescribed treatments and meets current BMP guidelines.
- Designated skid trails will be required where moist soils or short steep pitches (less than 300 feet) will not be accessed by other logging systems. This will reduce the number of skid trails and the potential for

erosion.

- Where designated skidding trails are required, timber in the trail area will be felled and skidded before the remaining timber in a harvest unit is felled. This will define felling patterns, facilitate skidding on designated trails, and reduce the area impacted by skidding equipment. Skidding plans are required to be in place prior to beginning logging operations.
- Skid-trail density in a harvest area will not exceed 15 percent of the total area. Existing skid trails will be used when possible.
- Ground skidding machinery will be required to be equipped with winchlines to limit equipment operation.

➤ *STREAM RESTORATION*

- All access roads will be removed upon project completion and all disturbed soils will be revegetated with native grasses and shrubs.
- Strict erosion-control measures will be practiced. BMPs that adhere to State standards will be practiced during project construction.
- Significant changes to project design or timing shall be coordinated with USFWS.
- No domestic or industrial chemicals will be discharged into Young Creek.
- Leaking equipment will not be permitted to operate in stream-crossing construction sites.

➤ *OTHER*

- The contractor would be responsible for the immediate cleanup of any spills (fuel, oil, dirt, etc.) that would affect water quality.
- Leaking equipment will not be permitted to operate in stream-crossing construction sites.
- Watershed-level planning and analysis is complete. The logging plans of USFS, as reported to the Cumulative Watershed Effects Cooperative, will be used.
- DNRC requested inventory information from DFWP. DNRC's mitigation plan for roads fits all recommendations for "impaired streams". Using "worst-case scenario" criteria provides for conservative operations in this proposal.

ROAD MANAGEMENT

- On the Young Creek section, a gate will be installed on the access road, Road 7812, from the south and on the road from the north (*see maps in CHAPTER II*) Slash and earthen barriers will be installed on all other access roads to reduce rutting and protect the established vegetative cover.
- The "Kelly-hump" closure at the junction of USFS Road 303 and Road 303B will be removed during harvesting operations and be replaced with a temporary gate. Following operational use of the 303B road system, the "Kelly-hump" closure would be replaced.
- A portion of the new road extending USFS Road 303B to Section 16 will be reclaimed with a layer of slash and debris.
- During dry periods, administrative use of the road system is allowed and access is available for DNRC's grazing allotment and agricultural lessee.
- Access routes for fence maintenance will be designated off the main roads.
- On the Sophie Lake section, the existing cable road closure on the south access route will be

maintained.

NOXIOUS WEED MANAGEMENT

- Surface blading may be required before the weed's seed-set stage. If the roads cannot be bladed before the seed-set stage, the roads with the least amount of weeds would be bladed first, followed by blading of areas with heavier infestations.
- All tracked and wheeled equipment are required to be clean of noxious weeds prior to beginning project operations. The Forest Officer that administrates the contract will inspect equipment periodically during project implementation.
- Prompt revegetation of disturbed roadside sites will be required. Roads used and closed as part of this proposal will be reshaped and seeded.
- As part of the USFS Temporary Road Use Permit, the Rexford Ranger District is collecting money to spray weeds.
- USFS roads leading into the Young Creek section would be sprayed to kill noxious weeds the year of timber harvesting and each year for 2 years following harvesting.
- DFWP would monitor the Young Creek Channel Restoration Project area.

AIR QUALITY

- Burning operations will comply with the reporting regulations and burning requirements of the Montana Airshed Group for Airshed 1.
- Ignition should be coordinated with other major burning operations unless the Montana Airshed Group has designated a "free-burn day".
- All harvest units will comply with the State Hazard Reduction Law and meet the High Standards when near residential structures.
- Approximately 4 miles of USFS Road 470 (Dodge Creek Road) and 3 miles of Road 303 will receive dust abatement.

WOLVES

A contract provision will be included to protect any wolf den site within the gross sale area that may be discovered during implementation of this proposal.

SNAG RETENTION

High-quality wildlife trees, such as large, broken-topped western larch and ponderosa pine will be designated for retention and given special consideration during yarding operations to prevent loss.

VISUALS

- Damaged residual vegetation will be slashed.
- The location, size, and number of landings will be limited.
- Disturbed sites will be grass seeded along road right-of-ways.

ARCHAEOLOGY

- A Timber Sale Contract clause provides for suspending operations if cultural resources are discovered; operations may resume only as directed by the Forest Officer.
- A DNRC archaeologist reviewed the project area.

APPENDIX B
YOUNG CREEK BANK STABILIZATION AND FISHERIES HABITAT IMPROVEMENT
(9 PAGES)

GENERAL PURPOSE

The proposed project aims to stabilize approximately 1,200 feet of Young Creek by realigning and shaping the channel to the appropriate dimension, pattern, and profile; installing log and rock vanes and rootwads throughout the project; and planting native vegetation along the riparian corridor to stabilize the stream banks. The project site owned by the state, and is located approximately 11 miles northwest of the town of Eureka, in Lincoln County (see Vicinity Map).

LOCATION OF PROJECT

This project will be conducted on Young Creek, located approximately 11 miles northwest of the town of Eureka, within a section of state owned land, in the NE ¼ of Section 16, T37 N, R28W, in Lincoln County.

NEED FOR THE PROJECT

Young Creek is one of the most important westslope cutthroat trout (*Oncorhynchus clarki lewisi*) spawning tributaries to Koocanusa Reservoir. Although bull trout (*Salvelinus confluentus*) do not routinely spawn in Young Creek, juvenile bull trout commonly enter Young Creek from the reservoir and rear for extended periods. This stream also provides water for agriculture, and other riparian-dependent resources. The proposed project is located on a portion of Young Creek has been severely impacted by past channel manipulations. During the 1950's, approximately 1,200 feet of the channel located on the state owned section on Young Creek was straightened, diked, and the stream channel moved near the toe of the hill slope. This channelization compromised the stream's ability to effectively transport sediment through the channelized area, which caused the channel to aggrade (deposit bedload materials) and exacerbate flood conditions. Ironically, these were presumably the conditions that the original channel modification aimed to alleviate. Consequently, the current aggradation has caused numerous problems with the stream, such as; poor aquatic habitat, increased flood potential, lateral bank scour and increased sediment supply. Additionally, livestock grazing and timber management in the upper reaches of Young Creek likely contributed to the instability of the channel. Currently this section of Young Creek is unable to adequately transport stream flow and bedload supply and still maintain a stable channel. This reach of Young Creek is classified as a D-4 channel type (braided; Rosgen 1996). The project site is a 1,200-foot, over-widened reach of Young Creek containing several mid-channel gravel bars and severely eroding stream banks. The intent of the project is to: 1) reduce the sediment sources and bank erosion throughout the project area by incorporating stabilization techniques that function naturally with the stream and which decrease the amount of stress on the stream banks; 2) convert the channelized portions of stream into a channel type that is self-maintaining and will accommodate floods without major changes in channel pattern or profile; 3) use natural stream stabilization techniques that will allow the stream to adjust slowly over time and be representative of a natural stream system; and 4)

improve fish habitat, particularly for westslope cutthroat trout, and improve the function and aesthetics of the river and adjacent riparian ecosystem.

SCOPE OF THE PROJECT

The project proposes to restore approximately 1,200 feet of degraded stream channel. The project calls for realigning the dimension, pattern, and profile of the stream based on a reference reach for a similar channel type.

The proposed plan view pattern (see Young Creek Restoration Map in Chapter II), longitudinal profile, and cross-sectional dimensions were derived using a variety of analytical approaches. These are summarized below.

REFERENCE REACH ANALYSIS

Montana FWP has conducted a geomorphic stream channel assessment on Young Creek to document the "reference" or potential channel conditions for the project area. The analysis included survey of channel pattern, profile, and typical cross-section dimensions for a stable reach of Young Creek located downstream of the proposed project and upstream of U.S. Forest Service road number 7176. Substrate composition, dimensionless ratio hydraulic geometry, and channel hydraulics were derived for the reference reach.

USFS AND MFWP STREAM GAGE INFORMATION

Channel hydraulics and the predicted flood series were calculated using information provided by the USFS (Rexford Ranger District) and Montana FWP (Libby Field Station). Cross-section analyses were completed by FWP in the vicinity of the project area and downstream in the reference reach area. Indirect methods including HEC-RAS and WinXSPRO modeling, and review of USGS equations (Omang 1992), were used to validate the predicted flood series and bankfull hydraulic conditions.

KOOTENAI NATIONAL FOREST HYDRAULIC GEOMETRY

Hydraulic geometry relationships developed by the Kootenai National Forest were used to develop cross-sectional design dimensions. The relationships were derived from analysis of over twenty reference reaches located on the Kootenai National Forest.

PROPOSED WORK

The proposed stream restoration work will require the installation of j-hook rock vanes, cobble gradient control structures, and the placement of a series of rootwads throughout the project area. Additionally, FWP will transplant numerous shrubs along the restored stream bank (Section V.4 below). This project is expected to cost approximately $45,000, which will be paid for by Montana FWP.

The current stream channel within the proposed project area is currently approximately 1,200 feet in length with an average stream gradient of 1.6% and an average bankfull width of approximately 40 feet. Due to the increased stream sinuosity the project will create, the stream length will be increased to approximately 1,600 feet and the average gradient decreased to 1.2%, and an average bankfull width of approximately 19 feet. Instream structures will be installed to provide for grade control, fish habitat, and interim protection of reconstructed stream banks. Interim stream bank protection will be provided by complex composites consisting of whole, stacked, and offset rootwads, deflector logs, and habitat trees. The primary purpose of these structures is to prevent stream bank erosion and improve near-channel complexity in the short-term until mature vegetation becomes established on the stream banks and floodplain. Vegetation

will be the primary stabilization mechanism in the long term.

Gradient control in the form of cross vanes and native material (sorted river alluvium) will be necessary as the channel bed will consist of a nonsorted mix of native alluvium immediately following construction. Since the channel will lack its natural armoring ability provided by the distribution of pavement and subpavement materials, the streambed will not be competent to withstand the tractive forces acting on the bed during high flows. Therefore, to maintain the designed channel profile (vertical stability) and prevent channel degradation in the first few years following project completion, grade control will be necessary in select areas.

The stream restoration project will utilize many structures to produce and enhance fisheries habitat, gradient control, and stream bank protection. The following structures are proposed:

- rootwad composites
- rock/log vanes
- rock/log cross vanes
- native material grade control
- riparian fence enclosure

Depending on the size and quantity of materials available, rock, log, and/or a combination of rock and log vanes will be incorporated in the final design, to provide gradient control throughout the project. Montana FWP will attempt to maximize the use of large-diameter wood in lieu of rock, where feasible.

The stream restoration project construction work will occur during the period September 1, 2003 thru November 15, this coincides with the time period when flows in Young Creek are at base level. Total construction time is expected to last no longer than three weeks during this period.

Montana FWP will install a perimeter fence adjacent to the stream to protect the stream channel and banks from livestock damage. Montana FWP and DNRC will consult with the grazing permittee to determine the optimal number and locations of these water gaps. Montana FWP will pay for the installation of the riparian fence, but all parties including the grazing permittee will be responsible for annual fence maintenance thereafter.

The project will be monitored to determine if objectives are met. Pre- and post-monitoring data that will be collected within the project area will include a total of approximately 15-25 permanent stream channel cross sections located in, above, and below the proposed project, a longitudinal profile, and numerous photo points. Fisheries population estimates have been conducted six years prior to work within the project area. These monitoring activities will be continued annually after project completion in order to allow us to determine how fish populations, channel morphology and dimension change in time in response to the prescribed channel modifications.

POTENTIAL IMPACTS ON THE PHYSICAL ENVIRONMENT

TABLE A-1 - POTENTIAL IMPACTS THE STREAM RESTORATION PROJECT MAY HAVE ON THE PHYSICAL ENVIRONMENT describes the potential impacts the stream restoration project may have on the physical environment. The comment index refers the reader to the section of the document that provides additional detail for that particular subject.

a. Terrestrial and aquatic life and habitats
   Restoration of 1,200 feet of degraded stream channel is expected to create a healthier habitat for aquatic life by improving channel stability,

TABLE A-1 - POTENTIAL IMPACTS THE STREAM RESTORATION PROJECT MAY HAVE ON THE PHYSICAL ENVIRONMENT

	MAJOR	MODERATE	MINOR	NONE	COMMENT INDEX
a. Terrestrial and aquatic life and habitats		X			a.
b. Water quality, quantity, and distribution		X			b.
c. Geology and soil quality, stability and moisture		X			c.
d. Vegetation cover, quantity and quality		X			d.
e. Aesthetics			X		e.
f. Air quality				X	
g. Unique, endangered, fragile, or limited environmental resources			X		g.
h. Demands on environmental resources of land, water, air and energy				X	
i. Historical and archaeological sites				X	i.
j. Cumulative effects			X		j.

reducing bank erosion, and providing for greater habitat diversity. Habitat for riparian-dependent wildlife also would be improved by enhancing the vegetation within the riparian corridor (see section d below).

The overall long-term impacts of this project are expected to have beneficial impacts to the aquatic and terrestrial life in Young Creek. However, there may be insignificant short-term adverse impacts to aquatic life during the construction phase of this project. Montana FWP has evaluated these impacts and determined them to be insignificant based on the following reasons. Any potential adverse impacts to the aquatic life in Young Creek would be limited to the period of construction, and will not be significant based on the low severity, short duration of project construction, and limited geographical extent of the project based on the relative size of the entire Young Creek watershed. Project timing precludes the possibility of construction activities damaging westslope cutthroat trout redds or incubating juveniles. Project construction scheduling has deliberately been determined to avoid periods when cutthroat trout would have eggs deposited in the gravel. Cutthroat trout in Young Creek typically spawn during May. During the period which construction is scheduled, adult adfluvial cutthroat trout will be residing in the reservoir. Therefore, construction scheduling will also ensure that any impacts to migrating adult cutthroat trout are insignificant. Performing construction in the dry throughout the majority of the project prior to diverting water into the newly constructed stream channel will also minimize the project's short-term impacts to local fish populations. These impacts will be further minimized by rescue efforts by Montana FWP personnel by capturing stranded

fish in isolated pools using electrofishing gear during the period when water is diverted into the newly constructed stream channel. Captured fish will be returned to the newly constructed sections of Young Creek or areas above the project area. Short-term turbidity should have negligible impacts to rearing fish downstream of the project. Several activities listed below will be implemented to limit short-term turbidity in Young Creek during project construction.

b. Water quantity, quality, and distribution.

Short-term increases in turbidity will occur during project construction, especially when Young Creek is routed into the newly constructed stream channel. To minimize turbidity, construction will occur during a low flow period and operation of equipment in the stream channel will be minimized to the extent practicable. The channel to be constructed will be constructed in the dry to minimize increases in suspended sediment during construction. Following completion of new channel, temporary diversion dams will be removed and stream flow reactivated in the newly reconstructed channel. Trash pumps may be used to dewater areas of the existing channel as necessary. Native materials will be used to construct plugs, or fill the existing stream channel at critical locations to ensure that the stream cannot gain access to the existing channel after construction is complete.

The stream restoration project will be required to obtain several permits from several state and federal agencies to ensure sufficient water quality standards are met. The Montana Department of Environmental Quality will be contacted to determine narrative conditions required to meet short-term water quality standards and protect aquatic biota. A 310 permit (Natural Streambed and Land Preservation Act) will be obtained from the local conservation district. In addition, this section of Young Creek is located on state trust land, which requires a land use license/easement from MT Department of Natural Resources and Conservation (DNRC).

c. Geology and soil quality, stability, and moisture

Soils along the stream margin will be disturbed during channel construction, but will be quickly stabilized following the proposed revegetation efforts. Overall, the project is expected to reduce bank erosion and improve channel stability by restoring a degraded portion of the channel to a proper dimension, pattern, and profile, and thereby reducing stream bank erosion.

d. Vegetation cover, quantity and quality.

Riparian vegetation and cover will be disturbed during the period of construction. However, proposed revegetation efforts will act to mitigate these disturbances.

The revegetation plan will consist of the following components:

- root stock vegetation with Vextar tubing
- dormant pole plantings
- whole shrub and sod transplants
- willow sprigs
-broadcast seed application

Approximately 1,000 individual containers consisting of a combination of black cottonwood, thin-leafed alder, sandbar willow, geyer willow or red osier dogwood will be planted on reconstructed stream banks,

channel plug areas, and floodplain areas. Dormant pole plantings, willow sprigs, and mature shrub and sod transplants will complement the revegetation effort in areas of high shear stress (i.e., meander bends). Finally, a broadcast seed application will be applied to all disturbed areas to facilitate the revegetation process within the project area. An aggressive and proactive revegetation plan will help prevent the possibility of noxious weeds from invading areas disturbed during project construction. Montana FWP will monitor the project site for a minimum of two years for the presence of noxious weeds. Control measures will be initiated if the monitoring efforts indicate substantial quantities of noxious weeds are present within the restoration project area.

e. Aesthetics.

The stream restoration project will improve the aesthetics by the enhancement of vegetation within the riparian corridor. In contrast, the installation of rootwad revetment, and rock and log vanes may detract from the overall aesthetics of the area. However, rootwads and j-hook vanes would be placed in a low profile manner to minimize visual impacts.

g. Unique, endangered, fragile, or limited environmental resources.

Young Creek supports westslope cutthroat trout. The westslope cutthroat trout has been designated as a species of special concern in Montana because of a continual and significant decline in natural populations. Bull trout spawning in Young Creek is not known to occur, although juvenile bull trout do occasionally enter from the reservoir and rear in Young Creek. The bull trout is listed as threatened under the Endangered Species Act. Because juvenile bull trout occur occasionally, the project will be included in Montana Fish, Wildlife and Parks' Section 6 conservation plan with the U.S. Fish and Wildlife Service. The proposed efforts are expected to improve pool habitat in a localized area. As a result, the project is expected to improve rearing conditions for juvenile westslope cutthroat trout, and migration conditions for adult fish. These habitat improvements are expected to be most beneficial to local populations of westslope cutthroat trout.

i. Historic and archaeological sites

The proposed project will require an individual Army Corp of Engineers 404 permit. Therefore, the State Historic Preservation Office has been contacted to determine the need for compliance with the federal historic preservation regulations. The project will not begin until a cultural clearance is granted.

j. Cumulative Effects.

We expect that the proposed stream restoration project will have long-term positive and beneficial trends with regard to bank erosion, westslope cutthroat trout habitat complexity and diversity, water temperature, and streamside vegetation. In contrast, if the stream restoration project is not implemented, it is very probable that aquatic conditions within lower Young Creek will continue to deteriorate.

POTENTIAL IMPACTS ON THE HUMAN ENVIRONMENT

The following table describes the potential impacts the stream restoration project may have on the human environment. The comment

index refers the reader to the section of the document that provides additional detail for that particular subject.

g. Access to and quality of recreational activities

Young Creek contains populations of westslope cutthroat trout, and although recreation sport fishing in Young Creek is not substantial, it is common. Restoration of approximately 1,200 feet of degraded stream channel would improve overall aquatic habitat within this reach of stream and, consequently, and may attract fish and improve fishing opportunities in the localized area.

h. Quantity and distribution of employment

The stream restoration project will be designed and implemented by Montana FWP personnel, but a contractor will perform all construction and excavation work for the project. Local and regional contractors will be allowed to bid on the project, and the lowest bidder capable of performing the job will be selected. Many past similar projects have been awarded to local contractors. Therefore, this project has the potential to make a positive contribution to the local economy by providing

	MAJOR	MODERATE	MINOR	NONE	UNKNOWN	COMMENT INDEX
a. Social structures and mores				X		
b. Cultural uniqueness and diversity				X		
c. Local and state tax base and tax revenue				X		
d. Agricultural or industrial production				X		
e. Human health				X		
f. Quantity and distribution of community and personal income				X		
g. Access to and quality of recreational and wilderness activities			X			g.
h. Quantity and distribution of employment			X	X		h.
i. Distribution and density of population and housing				X		
j. Demands for government services				X		
k. Industrial and commercial activity				X		
l. Demands for energy				X		
m. Locally adopted environmental plans and goals				X		
n. Transportation networks and traffic flows				X		

employment opportunity for local heavy equipment operators.

DISCUSSION AND EVALUATION OF REASONABLE ALTERNATIVES

NO-ACTION ALTERNATIVE

If no action is taken, this reach of Young Creek will continue to be relatively unstable and will continue to provide limited habitat for fish. Additionally, bank erosion will continue to accelerate, and provide a source of continual bedload sedimentation to lower Young Creek. Recreational opportunities associated with fish and wildlife resources will remain reduced and aesthetics will continue to be impaired.

THE PROPOSED ALTERNATIVE

The proposed alternative is designed to stabilize approximately 1,200 feet of degraded channel in Young Creek by adjusting channel morphology to increase the competency to carry bedload and by stabilizing an eroding stream bank using rootwads, j-hook vanes, and revegetation. Although the construction activities will likely have a non-significant negative impact on the aquatic life in this section of Young Creek, we believe the long-term benefits of the restoration efforts outweigh these short-term impacts. The stream restoration project will also benefit aquatic life downstream of the project site by reducing a source of bedload sediment that is currently originating from within the proposed project reach and being delivered downstream. We believe that the implementation of this restoration project will help restore the ecological form and function of lower Young Creek to a state that more closely resembles normative condition. Restoration efforts are expected to attract fish, and improve habitat and fishing opportunities in the localized area. A secondary benefit of this alternative is the demonstration value of using softer techniques in bank stabilization work.

ENVIRONMENTAL ASSESSMENT CONCLUSION SECTION

1. We conclude from this review that the proposed activities will have a long-term positive impact on the physical and human environment, and that any adverse impacts to aquatic life in Young Creek would be limited to the construction period and would not be significant.

2. Other groups or agencies contacted or which may have overlapping jurisdiction.

   Montana Department of Natural Resources and Conservation, Lincoln Conservation District, NRCS, US Fish and Wildlife Service, US Army Corp of Engineers, Montana Department of Environmental Quality, State Historic Preservation Office. This section of Young Creek is located on the state owned portion of land, and therefore project implementation will require a land use license/ easement issued by the Montana Department of Natural Resources and Conservation (DNRC).

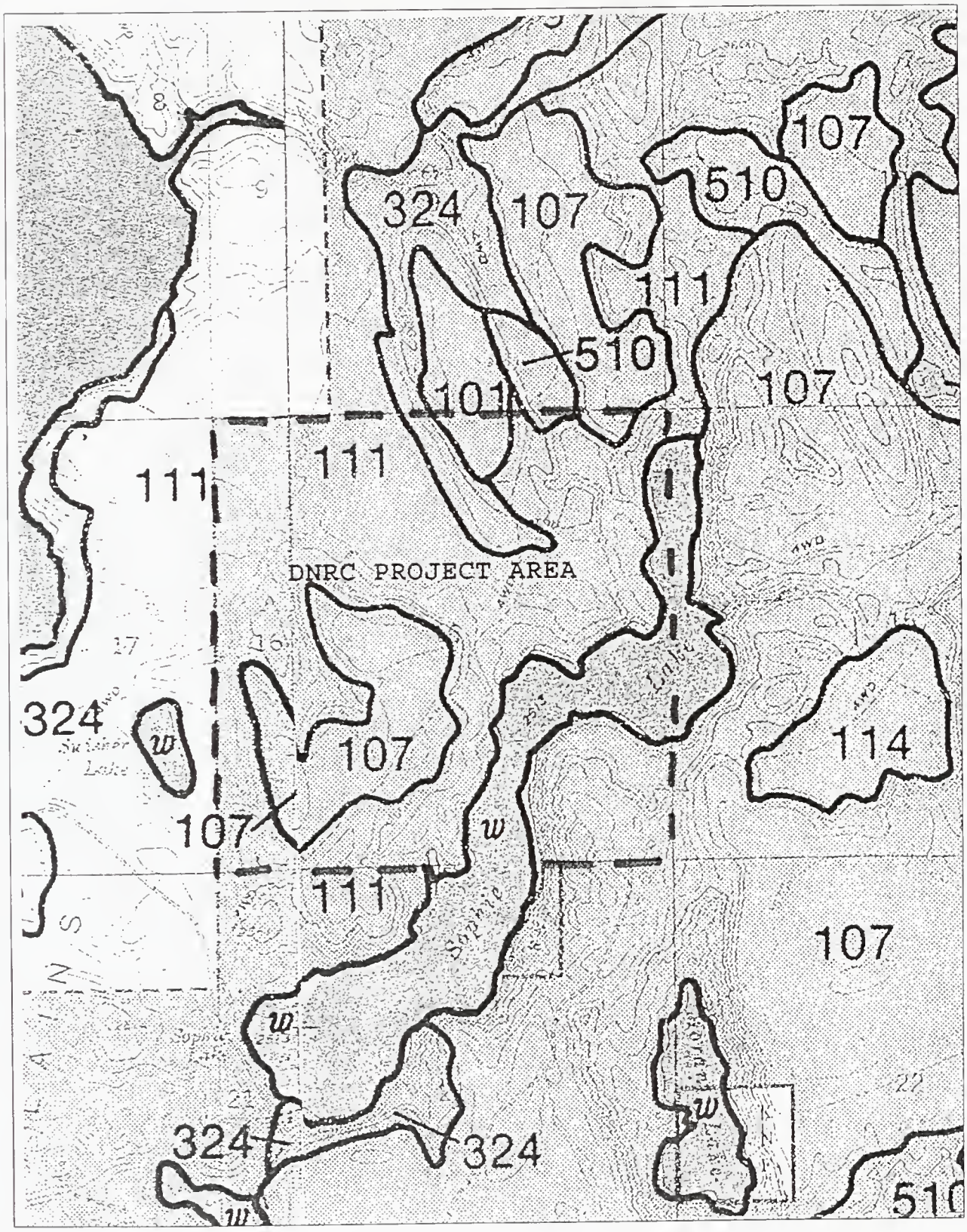
TABLE OF CONTENTS

APPENDIX C
SOILS TABLE AND MAP

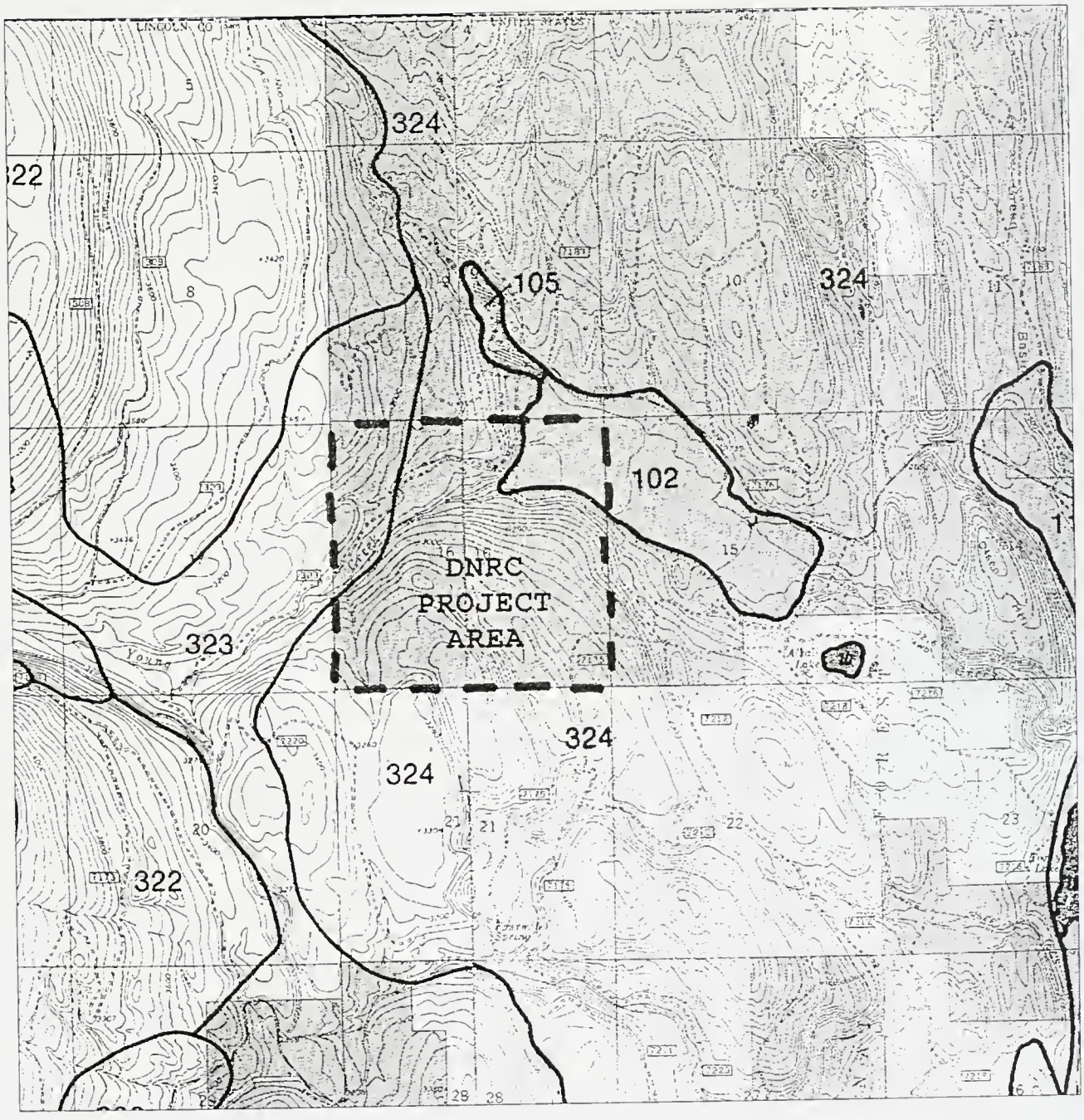
LANDTYPES ASSOCIATED WITH THE YOUNG SOPHIE PROJECT AREA

LANDTYPE	ACRES	DESCRIPTION
Sophie Lake Section		
111	373	Characteristic of this landtype are low-relief terraces with flat to gently rolling surfaces and undefined drainage patterns. Soils in this landtype are silty to very fine sand with low sediment delivery efficiency. Grasslands dominate this landtype, which is well suited to road building, although native surface roads are a source for wind-borne sediment.
107	160	This landtype contains soils formed in calcareous, very gravelly sandy glacial outwash deposits. Areas with this landtype generally occupy the highest valleys and occur as rolling plains. Sediment delivery efficiency is low. Soils in this landtype are well suited to road construction although revegetation may be limited by droughtiness.
324	25	Soils in this landtype generally exhibit a gravelly silt loam surface layer with very gravelly silt loam subsoil. Sediment delivery efficiency is low. This landtype is moderately suited to timber management and well suited to road construction. Revegetation is limited by droughtiness and surface crusts that form on exposed material.
101	12	Soils have a silt loam surface layer and sandy loam subsoils formed in recent alluvial deposits. Sediment delivery efficiency is low. This landtype is moderately suited to timber management; however, equipment operation can result in rutting, compaction, and displacement of surface layers if not properly mitigated.
510	5	This landtype is most often found on south and west aspect mountain slopes. Surface layer consist of gravelly silt loam overlying a subsurface layer of very gravelly silt loam resulting in well-drained soils. This landtype is well suited for road construction, but poorly suited for timber production due to limitations on revegetation.
Young Creek Section		
324	499	Soils in this landtype generally exhibit a gravelly silt loam surface layer with very gravelly silt loam subsoil. Sediment delivery efficiency is low. This landtype is moderately suited to timber management and well suited to road construction. Revegetation is limited by droughtiness and surface crusts that form on exposed material.
323	83	Rolling foothills and drumlins are characteristic of this landtype. Soils in this landtype are formed in calcareous glacial till. Surface layers consist of gravelly silt loam over a gravelly silt loam to silty clay loam subsoil, resulting in moderate to well-drained soils. This landtype is well suited for timber management and moderately suited to road construction, except on steep slopes where the suitability is poor.
102	58	Soils in this landtype are generally located adjacent to waterbodies. This landtype consists of terraces formed by silty lake sediment deposits. Sediment delivery efficiency is low on the terrace surfaces and high on scarp faces. This landtype is well suited for timber management due to the high productivity of the sites. Road construction suitability is poor due to the erosion potential of material exposed during construction and low-bearing strength of the soil.

SOPHIE LAKE SECTION, SECTION 16, T37N, R27W
SOIL LANDTYPES



YOUNG CREEK SECTION, SECTION 16, T37N, R28W
SOIL LANDTPES



GLOSSARY

Administrative road use
Road use that is restricted to DNRC personnel and contractors or for purposes such as monitoring, forest improvement, fire control, hazard reduction, etc.

Airshed
An area defined by a certain set of air conditions; typically, a mountain valley in which air movement is constrained by natural conditions such as topography.

Alevins
Juvenile fish in the developmental stage, where the egg yolk sac is still attached.

Appropriate conditions
Describes the set of forest conditions determined by DNRC to best meet the SFLMP objectives. The 4 main components useful for describing an appropriate mix of conditions are covertype proportions, age-class distributions, stand-structural characteristics, and the spatial relationships of stands (size, shape, location, etc.), all assessed across the landscape.

Bald eagle primary-use area
An area where it is assumed that 75 percent of the foraging, resting, and associated behaviors occur.

Basal area
A measure of the number of square feet of space occupied by the stem of a tree.

Bedload aggredation
Stream sediment consisting of sand, gravel, cobbles, and small boulders is termed bedload. Bedload aggredation is the accumulation of bedload sediment in a particular location.

Benthic
Bottom dwelling.

Best Management Practices (BMPs)
Guidelines to direct forest activities, such as logging and road construction, for the protection of soils and water quality.

Biodiversity
The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

Board foot
144 cubic inches of wood that is equivalent to a piece of lumber 1 inch thick by 1 foot wide by 1 foot long.

Canopy
The upper level of a forest consisting of branches and leaves of the taller trees.

Canopy closure
The percentage of a given area covered by the crowns, or canopies, of trees.

Cavity
A hollow excavated in trees by birds or other animals. Cavities are used for roosting and reproduction by many birds and mammals.

Coarse down woody material
Dead trees within a forest stand that have fallen and begun decomposing on the forest floor.

Compaction
Increased soil density caused by force exerted at the soil surface, modifying aeration and nutrient availability.

Connectivity
The quality, extent, or state of being joined; unity; the opposite of fragmentation.

Cover
See *Hiding cover* and/or *Thermal cover*.

Co-dominant tree
A tree that extends its crown into the canopy, receiving direct sunlight from above and limited sunlight on its sides. One or more sides are crowded by the crowns of other trees.

Crown cover or crown closure
The percentage of a given area covered by the crowns of trees

Cull
A tree of such poor quality that it has no merchantable value in terms of the product being cut.

Cutting units
Areas of timber proposed for harvesting.

Cumulative effect
The impact on the environment that results from the incremental impact of the action when added to other actions. Cumulative impacts can also result from individually minor actions, but collectively they may compound the effect of the actions.

Direct effect
Effects on the environment that occur at the same time and place as the initial cause or action.

Ditch relief
A method of draining water from roads using ditches and corrugated metal pipe. The pipe is placed just under the surface of the road.

Dominant tree
Those trees within a forest stand that extend their crowns above surrounding trees and capture sunlight from above and around the crown.

Drain dip
A graded depression built into a road to divert water and prevent soil erosion.

Ecosystem
An interacting system of living organisms and the land and water that make up their environment; the home place of all living things, including humans.

Environmental effects
The impacts or effects of a project on the natural and human environment.

Equivalent clearcut acres (ECA)
This method equates the area harvested and the percent of crown removed with an equivalent amount of clearcut area.

Allowable ECA - The estimated number of acres that can be clearcut before stream channel stability is affected.

Existing ECA - The number of acres that have been previously harvested, taking into account the degree of hydrologic recovery that has occurred due to revegetation.

Remaining ECA - The calculated amount of harvesting that may occur without substantially increasing the risk of causing detrimental effects to the stability of the stream channel.

Excavator piling
The piling of logging residue using an excavator.

Fire regimes
Describes the frequency, type, and severity of wildfires. Examples include: frequent nonlethal underburns; mixed-severity fires; and stand-replacement or lethal burns.

Forage
All browse and nonwoody plants available to wildlife for grazing.

Forest improvement
The establishment and growing of trees after a site has been harvested. Associated activities include:

- site preparation, planting, survival checks, regeneration surveys, and stand thinnings;
- road maintenance;
- resource monitoring;
- noxious-weed management; and
- right-of-way acquisition on a State forest.

Fragmentation (forest)
A reduction of connectivity and an increase in sharp stand edges resulting when large contiguous areas of forest with similar age and structural character are interrupted through disturbance (stand-replacement fire, timber harvesting,

etc.)

Geomorphical
A term referring to the shape of the earth or its topography.

Habitat
The place where a plant or animal naturally or normally lives and grows.

Habitat type
The place or type of site where a plant or animal naturally or normally lives and grows.

Hazard reduction
The reduction of fire hazard by processing logging residue with methods such as separation, removal, scattering, lopping, crushing, piling and burning, broadcast burning, burying, and chipping.

HEX-RAS
A computer software package used to model stream flows.

Hiding cover
Vegetation capable of hiding some specified portion of a standing adult mammal from human view at a distance of 200 feet.

Historical forest condition
The condition of the forest prior to settlement by Europeans.

Indirect Effects
Secondary effects that occur in locations other than the initial action or significantly later in time.

Interdisciplinary team (ID Team)
A team of resource specialists brought together to analyze the effects of a project on the environment.

Intermediate trees
A characteristic of certain tree species that allows them to survive in relatively low light conditions, although they may not thrive.

Interstitial
The spaces between the rocks that make up a stream's substrate.

Landscape
An area of land with interacting ecosystems.

Macroinvertebrates
Aquatic insects.

Meter
A measurement equaling 39.37 inches.

Mitigation measure
An action or policy designed to reduce or prevent detrimental effects.

Morphology
The general shape of the stream.

Multistoried stands
Timber stands with 2 or more distinct stories.

Nest-site area (bald eagle)
The area in which human activity or development may stimulate abandonment of the breeding area, affect successful completion of the nesting cycle, or reduce productivity. This area is either mapped for a specific nest based on field data, or, if that is impossible, is defined as the area within a quarter-mile radius of all nest sites in the breeding area that have been active within 5 years.

No-action alternative
The option of maintaining the status quo and continuing present management activities; the proposed project would not be implemented.

Nonforested area
A naturally occurring area where trees do not establish over the long term, such as bogs, natural meadows, avalanche chutes, and alpine areas.

Old growth
For this analysis, old growth is defined as stands that meet the minimum criteria (number of trees per acre that have a minimum dbh and a minimum age) for a given site (old-growth group from habitat type). These minimums can be found in the *Green et al Old Growth Forest Types of the Northern Region* (see

APPENDIX A - REFERENCES).

Overstory
The level of the forest canopy including the crowns of dominant, codominant, and intermediate trees.

Patch
A discrete area of forest connected to other discrete forest areas by relatively narrow corridors; an ecosystem element (such as vegetation) that is relatively homogeneous internally, but differs from what surrounds it.

Periphyton
Single-celled algae.

Permeability
The ease or rate that water passes through a layer or object.

Porosity
The quality or state of having holes through which fluid or air may pass.

Potential nesting habitat (bald eagle)
Sometimes referred to as 'suitable nesting habitat,' areas that have no history of occupancy by breeding bald eagles, but contain the potential to do so.

Project file
A public record of the analysis process, including all documents that form the basis for the project analysis. The project file for the Young/Sophie Timber Sale and Stream Restoration Project Ea is located at the Stillwater State Forest office near Olney, Montana.

Redds
The spawning ground or nest of various fish species.

Regeneration
The replacement of one forest stand by another as a result of natural seeding, sprouting, planting, or other methods.

Residual stand
Trees that remain standing following any harvesting operation.

Road-construction activities
In general, the term 'road construction activities' refers to all the activities conducted while building new roads, reconstructing existing roads, and obliterating roads. Thee activities may include any or all of the following:

- road construction;
- right-of-way clearing;
- excavation of cut/fill material;
- installation of road surface and ditch drainage features;
- installation of culverts at stream crossings;
- burning right-of-way slash;
- hauling and installation of borrow material; and
- blading and shaping road surfaces.

Road improvements
Construction projects on an existing road to improve ease of travel, safety, drainage, and water quality.

Salmonids
Member of the trout family

Saplings
Trees 1 to 4 inches in diameter at breast height.

Sawtimber trees
Trees with a minimum dbh of 9 inches.

Scarification
The mechanized gouging and ripping of surface vegetation and litter to expose mineral soil and enhance the establishment of natural regeneration.

Scoping
The process of determining the extent of the environmental assessment task. Scoping includes public involvement to learn which issues and concerns should be addressed and the depth of assessment that will be required. It also includes a review of other factors, such as laws, policies, actions by other landowners, and jurisdictions of other agencies that may affect the extent of assessment needed.

Security

For wild animals, the freedom from the likelihood of displacement or mortality due to human disturbance or confrontation.

Seedlings
Live trees less that 1 inch dbh.

Sediment
In bodies of water, solid material, mineral or organic, that is suspended and transported or deposited.

Sediment yield
The amount of sediment that is carried to streams.

Seral
Refers to a biotic community that is in a developmental, transitional stage in ecological succession.

Shade intolerant
Describes the tree species that generally can only reproduce and grow in the open or where the overstory is broken and allows sufficient sunlight to penetrate. Often these are seral species that get replaced by more shade-tolerant species during succession. In Stillwater State Forest, shade-intolerant species generally include ponderosa pine, western larch, Douglas-fir, western white pine, and lodgepole pine.

Shade tolerant
Describes tree species that can reproduce and grow under the canopy in poor sunlight conditions. These species replace less shade-tolerant species during succession. In Stillwater State Forest, shade-tolerant species generally include fir, Engelmann spruce, and western red cedar.

Siltation
The process of very fine particles of soil (silt) settling. This may occur in streams or from runoff. An example would be the silt build-up left after a puddle evaporates.

Silviculture
The art and science of managing the establishment, composition, and growth of forests to accomplish specific objectives.

Sinuosity
A measure of meander within a stream.

Site preparation
A hand or mechanized manipulation of a harvested site to enhance the success of regeneration. Treatments are intended to modify the soil, litter, and vegetation to create microclimate conditions conducive to the establishment and growth of desired species.

Slash
Branches, tree tops, and cull trees left on the ground following a harvest.

Snag
A standing dead tree or the portion of a broken-off tree. Snags may provide feeding and/or nesting sites for wildlife.

Snow intercept
The action of trees and other plants in catching falling snow and preventing it from reaching the ground.

Spur roads
Low standard roads constructed to meet minimum requirements for harvest-related traffic.

Stand
An aggregation of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition so as to be distinguishable from the adjoining forest.

Stand density
Number of trees per acre.

Stocking
The degree of occupancy of land by trees as measured by basal area or number of trees, and as compared to a stocking standard, which is an estimate of either the basal area or number of trees per acre required to fully use the growth potential of the land.

Stream gradient
The slope of a stream along its course, usually expressed in percentage indicating the amount of drop per 100 feet.

Stumpage
The value of standing trees in the forest; sometimes used to mean the commercial value of standing trees.

Substrate scoring
Rating of streambed particle sizes.

Succession
The natural series of replacement of one plant (and animal) community by another over time in the absence of disturbance.

Suppressed
The condition of a tree characterized by a low growth rate and low vigor due to competition.

Temporary road
Roads built to the minimal standards necessary to prevent impacts to water quality and provide a safe and efficient route to remove logs from the timber sale area. Following logging operations, reclamation would incorporate the following concepts to discourage future motorized use of the roads:

- Segments near the beginning of the new temporary road systems would be reshaped to their natural contours and reclaimed for approximately 200 feet by grass seeding and strewing slash and debris.
- The reclamation of the remaining road would include a combination of ripping or mechanically loosening the surface soils on the road, removing culverts or bridges that were installed, spreading forest debris along portions of the road, and allowing the surface to revegetate naturally.

Territoriality
The behavioral pattern exhibited by an animal defending its territory.

Texture
A term used in visual assessments indicating distinctive or identifying features of the landscape depending on distance.

Thermal cover
For white-tailed deer, thermal cover has 70 percent or more coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller.

For elk and mule deer, thermal cover has 50 percent or more coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller.

Timber-harvesting activities
In general, the term timber-harvesting activities refers to all the activities conducted to facilitate timber removal before, during, and after the timber is removed. These activities may include any or all of the following:

- felling and bucking standing trees into logs;
- skidding logs to a landing;
- processing, sorting, and loading logs onto trucks at the landing;
- hauling logs by truck to a mill;
- slashing and sanitizing residual vegetation damaged during logging;
- machine piling logging slash;
- burning logging slash;
- scarifying and preparing the site for planting; and
- planting trees.

Understory
The trees and other woody species growing under a, more or less, continuous cover of branches and foliage formed collectively by the overstory of adjacent trees and other woody growth.

Uneven-aged stand
Various ages and sizes of trees growing together on a uniform site.

Ungulates
Hoofed animals, such as mule deer, white-tailed deer, elk, and moose, that are mostly herbivorous; many

are horned or antlered.

Vigor
The degree of health and growth of a tree or stand of trees.

Watershed
The region or area drained by a river or other body of water.

Water yield
The average annual runoff for a particular watershed expressed in acre-feet.

Water-yield increase
Due to forest canopy removal, an increase in the average annual runoff over natural conditions.

Windthrow
A tree pushed over by wind. Windthrows (blowdowns) are common among shallow-rooted species and in areas where cutting or natural disturbances have reduced the density of a stand so individual trees remain unprotected from the force of the wind.

Win XSPRO
A computer software package used to model stream flows.

ACRONYMS

ARM	Administrative Rules of Montana
BMP	Best Management Practices
dbh	diameter at breast height
DEQ	Department of Environmental Quality
DFWP	Montana Department of Fish, Wildlife and Parks
DNRC	Department of Natural Resources and Conservation
EA	Environmental Assessment
ECA	equivalent clearcut acres
EIS	Environmental Impact Statement
FI	forest improvement
FRTA	Federal Roads and Trails Act
ID Team	Interdisciplinary Team
KNF	Kootenai National Forest
Land Board	Board of Land Commissioners
MBF	thousand board feet
MCA	Montana Codes Annotated
MEPA	Montana Environmental Policy Act
MMBF	million board feet
NWLO	Northwestern Land Office
SFLMP	State Forest Land Management Plan
SLI	stand-level inventory
SMZ	streamside management zone
TMDL	total maximum daily load
TRUP	Temporary Road Use Permit
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
124 Permit	Stream Protection Act Permit
310 Permit	Montana Natural Streambed and Land Preservation Act
318 Authorization	Authorization A—Short-term Exemption from Montana's Surface Water quality Standards
404 Permit	Federal Clean Water Act Permit

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
STILLWATER UNIT OFFICE - STILLWATER STATE FOREST
P.O. BOX 164
OLNEY, MT 59927
(406) 881-2371

Persons with disabilities who need an alternative, accessible format of this document should contact DNRC at the address or phone number shown above.